GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

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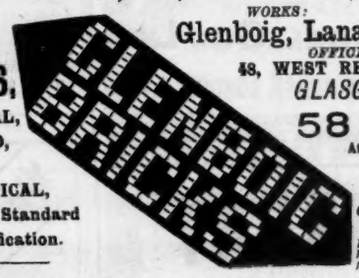

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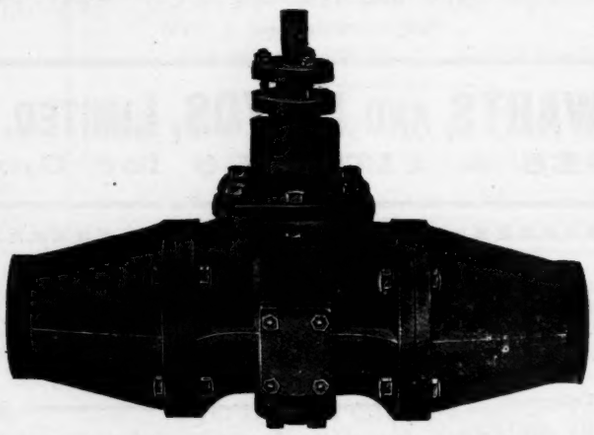

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VOL. CXLIX., No. 2960.] TUESDAY, FEBRUARY 3, 1920. [72ND YEAR.

EDITORIAL NOTES.

A Definite Ruling by the Coal Mines Department.

THE controversy, indecision, and diversity of procedure that have been piled around the Instructions of the Coal Controller in relation to the method of calculating the allowance on consumers' domestic gas accounts in respect of the 10s. rebate upon the proportion of coal used for the provision of domestic gas, have brought from the Coal Mines Department a definite ruling. It is communicated in a letter in our "Correspondence" columns from Mr. Edward J. Fottrell, the Manager to the National Gas Council. The ruling is put in plain terms; and it leaves no ground for further dispute as to the intentions of the Department in making the calculation, though a preceding quarter supplies a basis that is highly questionable for application to a succeeding quarter. It states that, in order to ensure uniformity of practice, and to permit of the rate of the allowance being calculated at as early a date as possible, the Department has decided that this figure shall be calculated upon the coal carbonized and the gas sold by an undertaking in the quarter prior to that for which the rate is being calculated. For instance, the rate of the allowance for the current quarter will be calculated on the coal carbonized and the gas sold during the quarter October-December, 1919. Subject to this, the explanation from the National Gas Council as published last week has the approval of the Department. It will be evident from this that an early calculation is desired; and the only object there can be in this is to set at rest the minds of the public in each supply area as to the amount by which they are to benefit from the 10s., less 5 p.ct. for expenses. Every undertaking can now proceed, on conditions that have passed and may not be reproduced in the current quarter, to work out the allowance which will have to be made per 1000 c.ft., whether or not the rebates received during the current quarter will supply sufficient cover. There is always clause 3, under which a deficiency or surplus can be carried forward to the succeeding quarter. If there are deficiencies, and the Order comes to an abrupt termination before adjustment can be made with the consumers, who is going to lose the deficiencies? No one knows; and so no one can tell us. There is no provision made for such a contingency. All that can be done is to trust that matters will come out all right in the end. The ruling, it will be observed, cancels the interpretation as to the meaning of the "previous" quarter given in the explanation from the National Gas Council as published last week, and which point of the explanation was then discussed editorially.

Big Figures from Horseferry Road.

WITH a total revenue for 1919 amounting to the unprecedented figure of £9,854,028, or £2,113,184 more than in 1918, and with a sale of gas 15½ p.ct. greater than in that year (which attests the stability of the business), the Gas Light and Coke Company, after paying the miserable dividends allowed under the Statutory Undertakings (Temporary Increase of Charges) Act, as mentioned in the Directors' report published elsewhere in this issue, have only £323,971 remaining to be carried forward to the current year's accounts, or £56,773 less than a year ago. This, in brief, is the financial result of a remarkable year. The position is the creation of the great costs of coal and other manufacturing materials, and of labour, together with the activity, during the first year free of war, in repairs, maintenance, and renewals in every direction, and the increased costs of these. We see that coal, which cost £4,033,769, advanced by £879,097 in comparison with 1918; oil, costing £382,879, was more by £105,123; and coke for water-gas manufacture, costing £335,022, was higher by £94,100. These increases on manufacturing materials alone total to £1,078,320. The extraordinarily larger business done contributed, of course, to the increased totals, but higher prices are mainly chargeable with these mountains of additional expenditure. It is seen that the coal carbonized amounted to 2,082,059 tons, or an increase of 220,156 tons on 1918; that the oil used—7,191,076 gallons—was greater than the year before by 1,441,044 gallons; and, of course, more coke and breeze were consumed. Nevertheless, higher prices all round are the main cause of the flight in costs. Fortunately, residuals came well to the aid of coal—more being sold (except tar and its products), and prices were higher. The total income from secondary products was £2,721,472, or an increase of £798,357 on 1918; but this last sum was short by over £80,000 of the higher cost of coal—to say nothing of the increases on oil and coke for making water gas. If the tar and tar products had not, in bringing in £358,832, fallen short of the previous year's figure by £48,279, the showing would have been better. Coke climbed up £750,927, and reached a total of £2,023,667; so producing the bulk of the increased revenue on secondary products. Breeze, in making £96,847, contributed a further £54,962; and the ammoniacal liquor and sulphate receipts were elevated to £290,403, or £40,745 more. However, deducting the total secondary products income from the cost of coal only, leaves a net charge for coal of £1,312,297, as compared with £1,231,557 in 1918. While mentioning coal, the less comfortable position of coal stocks is noticed. At Dec. 31 last there were only in store 164,735 tons, as compared with 236,112 tons a year before.

So much for the increased costs of all manufacturing materials. There are the wages of the gas workers. The enormous sum of £2,605,779 was distributed among them last year, or £743,585 more than in 1918, and—note this—£1,541,700 more than in 1913. These are marvellous figures. Increased wages since 1913 represent 145 p.ct.; whereas the advance of salaries from £190,656 in 1913 to £317,917 for last year is only 66·7 p.ct. The other great line of expenditure is repairs, maintenance, and renewals. Not so much as would have been preferable could be done during the war in such work through lack of needful materials and men; and now both can be obtained, their costs are enormously high. The Company have evidently been showing great activity in these directions during this first year of release from the war. If we turn to the capital account, a charge of £247,773 is noted for buildings and machinery in extension of works, whereas in the preceding year only £10,159 was charged. New and additional mains and service-pipes account for £64,543; the item in the previous year being represented by only £4523. In the revenue account under manufacture, there is a charge of £1,408,955 for repair and maintenance of works, which is an increase of £546,673 over 1918. In the distribution department, repair and maintenance of mains and services are up to £377,205, or £152,301 more. The charge of £292,347 for repair and renewal of meters is greater by £43,384; and that for the repair and renewal of stoves, £300,544, is more by £94,386. A large part of these extra charges are due to the higher costs of everything required, and for labour; but they also testify to the fact that great energy is being displayed in setting the Company's "house" in order, and in preparing for progress of business. The figures, or the majority of them, to which we have been referring are the

ones that so considerably aided the expenditure in totalling up to £9,004,164—an increase upon 1918 of no less than £2,313,419. Thus though the revenue was £9,854,028, the balance to the net revenue account receded from £1,050,099 in 1918 to £849,864—a drop of £200,235.

It has been mentioned that the sales of gas increased by 15½ p.ct.; and it is noteworthy that while the first half year showed an increase of 10 p.ct., the second half gave one of 21½ p.ct. In 1918, there was a reduction of 7 p.ct. in gas consumption. In these figures the effects of the Fuel and Lighting Order and its cancelling (so far as gas and electricity are concerned) are seen. The figures are remarkable in view of the high price of gas, which in the case of the Company last year fluctuated from 4s. 4d. to 4s. 2d. and then up to 4s. 8d.—this the result of the 6s. rise in the price of coal. But there were six months of the 4s. 2d. price; and only three months each of the other two prices. The enormous jump in gas sold was 4,090,143,000 c.ft.—the total sales having been 30,508,889,000 c.ft., compared with 26,418,746,000 c.ft. in 1918. These are figures that want pondering over in order to grasp their significance. The increase of 4,090,143,000 c.ft. (to which private consumers contributed 3,937,737,000 c.ft., and public street lighting 152,406,000 c.ft.) suggests work at high pressure on the part of the Chief Engineer (Mr. Thomas Goulden) and the officers, staffs, and men at the several stations; and this while plant improvement and extensions have been in progress. Looking back, proprietors will be gratified to learn that the total sale of 30,508,889,000 c.ft. is in excess of the sale of 1914 by no less than 3,722,394,000 c.ft. Of course, consumers have increased, and so have the number of gas-consuming appliances. At the end of 1914, the Company had 794,771 consumers; and there has since been an addition of 34,478, though house building has been suspended by the war. We cannot tell from the published accounts what the effect of the variations of price have been upon the gas revenue; but the large increase of consumption had considerable effect (probably to an extent approaching £900,000) in producing the additional gas revenue. While the rental of meters has remained practically the same, at £160,612, the rental of stoves (£191,865) has increased by £6587, and the rental of fittings by £84,871, to £235,588. The Company have now put 50 p.ct. on to the hiring rates of stoves; but this did not greatly affect the past year. In the report the Directors state that a large number of the consumers have availed themselves of the offer to purchase at reasonable rates the stoves they have had on hire. In the capital account we see a credit, "Stoves sold, £137,053."

A few words as to the manufacturing results. We have seen that 2,082,059 tons of coal were carbonized, and that 7,191,076 gallons of oil were used. The total amount of gas made was 33,255,720,000 c.ft., or 4,045,637,000 c.ft. more than in 1918. The coal gas made was 25,402,284,000 c.ft., and the water gas 7,853,436,000 c.ft.—the latter being about 23·6 p.ct. of the total gas made. The make of gas per ton was 12,200 c.ft., or 248 c.ft. per ton more than in 1918. In water-gas manufacture, the oil used equalled 0·915 gallon per 1000 c.ft., as compared with 0·82 gallon in 1918.

At the meeting next Friday, the Governor (Mr. D. Milne Watson) will have some gigantic figures to handle—figures of a magnitude that have never before had to be dealt with at a meeting of any gas company. If the outcome of the working is not all the proprietors could wish in respect of dividend, owing to statutory limitation, they have the satisfaction of knowing that the business has borne all the heavy charges referred to at a price for gas less than double the pre-war charge; and yet the business is now bursting out well beyond the maximum limits reached in pre-war years. With the revision promised by the Government, of the financial terms on which gas undertakings are conducted, and a recession of costs (they are not likely ever to sink to the pre-war levels), the future may be looked to with the utmost confidence.

Liveliness and Efficiency at the Gas Sales End.

THE Junior Gas Associations are just now paying much attention to questions affecting the distribution of gas, the increase of consumption, and the sales of appliances. The last issue of the "JOURNAL" contained two papers—one by Mr. James M'Ghee, of Glasgow, on "Some Distribution Topics;" and the other by Mr. I. H. Massey, of Oldham, on "Industrial and Domestic Gas Appliances." This week we report a lecture by Dr. Harold Hartley, in which he deals with advances in gas appliances; and should have had an address by Mr. R. J. Rogers, on "Gas Sales Problems." At the time of writing, we have not Mr. Rogers's address before us, so do not know the line he took. As these contributions (which are all highly encouraging through optimism born of experience) are read, they give rise to certain reflections. The sales department of every gas undertaking at the present time more than ever in the past requires to be raised to the utmost efficiency, both technically and commercially; and steps must be taken to do this. With the price of gas at much higher levels than before the war, with the changes in the quality and composition of gas which necessitate adjustment of gas appliances, and with the costs of gas appliances so much heavier than formerly, we have difficulties and fresh considerations to face in obtaining additional business. Competitors, too, are getting keener. But *per contra* there are advantages on our side; and of these we have to make the utmost use. One of the advances which we hope will shortly be effected, is the change to the sale of gas on a heat-unit basis. This, it is true, is a revolutionary idea; and Mr. M'Ghee sees the spectre of trouble in the background. For our own part, we are thorough believers in the ultimate commercial value to the gas industry of the new arrangement. What the industry should do now is to encourage people to look upon it as the supplier of a handy form of heat energy, which is applicable to lighting, heating, and power just as desired. If there is ultimate advantage in doing this, then any trouble that has to be encountered in crossing the bridge will be more than compensated for when we reach the other side.

Another benefit to gas undertakings, and this a growing one, is the progress that is being made by manufacturers in the efficiency of gas appliances. Those manufacturers who make the greatest progress this way will win the largest custom; for the plain fact is that gas undertakings, under the new working conditions, cannot in their own interests afford to tolerate inefficiency in the appliances they will in future be fixing in dwelling-houses, factories, and other places. Dr. Hartley shows how efficiency is advancing. In doing so, he incidentally makes reference to an old controversial point. He regrets that in the gas industry the gross calorific value should be employed instead of the net. We are afraid that Dr. Hartley looks at the matter from the point of view only of the manufacturer of gas appliances, and not of the suppliers of gas—seeing that, if the calorific value of the gas is rendered as net, the efficiency of gas appliances would show a higher percentage. But decades ago (long before Dr. Hartley's time) Parliament laid down the principle in relation to gas standards that gas *per se* was entitled in testing to the highest illuminating power that could be developed from it. And it is this principle that has been continued in relation to calorific power. True, at the beginning of the adoption of a calorific standard, "net value" was named; but this was soon altered to "gross" when Parliament appreciated the point that the gas was entitled to all the heat directly obtainable from it, especially as in some at least of the uses to which it is put the whole of the heat is utilized. The point of view of an advocate varies as to the expression of net or gross calorific values according to his interests.

However, that by the way. A more important matter is that our appliance manufacturers—testimony runs through the lecture—are looking more to the construction of appliances from the efficiency standpoint. When we see mention of hot-plate efficiencies of 50 to 60 p.ct., and boiling-ring efficiencies of 65 p.ct. using a tinned iron kettle, geysers showing 84 to 88 p.ct. efficiency on the gross, and self-contained water-heaters 60 to 66 p.ct. efficiency, there is satisfaction that, at both ends of the work of the industry, matters are taking a course that will prove highly favourable to the development of business on the heat-unit basis. But in both Mr. Massey's paper and Dr. Hartley's lecture, there is the warning that particular study should be made by the responsible men in the commercial department as to the conditions of use, so that the right type of appliance is recommended—the one that, while efficiently doing the work required, will produce the highest economy for the consumer. In the observance of this rule lies business stability. For instance, gas-heated water circulators should never be installed where a geyser will suffice. Then, useful and popular as gas-furnaces are, there is scope for much to be accomplished in improving their efficiency. We gave an account last week of what is being done by Messrs. Roberts and

Newton Booth in this direction, whereby very considerable saving is being effected in the consumption of gas and yet a gain is secured in working temperatures. Dr. Hartley in his lecture produces some notable gas-furnace figures showing, among other things, in high-temperature operations very large reductions in the consumption of gas by pre-heating both metal and air. If anything, the effect is greater from the pre-heating of the metal than from the pre-heating of the air. But the two combined produces the largest economy; and not only is economy served by pre-heating the air, but the temperature reached on combustion is enhanced. In low-temperature operations, no great saving is to be anticipated from pre-heating the air—in fact, the greatest loss of energy in such work is found to take place through the walls of the furnaces. This is where the economy promoting work of Messrs. Roberts and Newton Booth comes in. While industry like this is being shown in working for higher efficiencies and for economy in industrial gas-furnaces, we do not feel at all perturbed by the statement of Dr. Hartley that oil as a fuel for furnace work possesses the majority of advantages of coal gas, and (at its present price) is equivalent to 500 B.Th.U. gas at 2s. per 1000 c.ft. The user of oil-furnaces has to buy the oil, store it, replenish his stores, and it involves labour that gas does not. Moreover, in industrial centres it is possible to supply gas through one service for manufacturing purposes at a fairly reasonable price. There is no call on the manufacturer to order a supply of gas, nor to store it. It is always there; and it asks for the minimum of labour to be expended upon it. It is an unostentatious servant; and, with ordinary care, it is faithful in the performance of its duties. It has many recommending qualities which oil does not possess.

Anyway, the industry is establishing a stronger position; its men are realizing, and working to meet, their greater responsibilities. The conditions of business are changing, or rather have changed greatly. In industries, Mr. Massey reminds us, shorter hours are being worked. This makes a difference to the factory lighting load. The longer hours at home of the workpeople are making greater demands upon gas for cooking purposes; and factories are turning more and more to gas for heating. Some manufacturers are wedded to old customs; but perseverance, Mr. Massey finds, will in most cases produce a divorce, and the installation of gas appliances. The same perseverance will prevent electric motors going in where the gas representative can show that, for long-hour work and fairly constant load, the balance of economy resides with the gas-engine. The responsible district man to-day must be a good strategist, and have his head packed with present-day knowledge of gas matters, and a capacity for using his knowledge. He must never be guilty of recommending a piece of gas apparatus where he knows that the conditions of use will not be economical; for this may produce more damage than gain. Further, in the industrial field more gas will have to be measured than formerly; and it will be seen from Mr. M'Ghee's paper, as published last week, that he wants the meter-makers quickly to pursue research, and see whether there are not ways and means of developing meters which will occupy less room, and yet register larger volumes of gas. He also presents data showing that, with advancing pressures, meters are not doing their duty, but are helping substantially to add to the item of unaccounted-for gas.

There is (these various contributions show) plenty of work for manufacturers of gas appliances to concentrate upon. All have a responsibility and duty. The best products for the changed circumstances of gas supply will receive the largest patronage. The sales departments of gas undertakings have their hands full; and we see the evidence of growing eagerness to bring to bear the best faculties upon gas commerce, which is to-day more a science and an art than ever it has been in the past.

Labour Wages Claims and Works Differentiation.

IN discussing on Jan. 20 the award made by the Industrial Court in respect of the last claim of the National Federation of General Workers for an increase of wages for gas employees, we questioned whether at this time of day it was altogether a politic thing, in respect of advances, to press for discrimination between undertakings on the basis of magnitude of output. This was not suggested out of want of sympathy with small undertakings; but because the principle of discrimination has not been applied until now right through the flow of the gas-wage tide of the past four or five years. Our discussion of the matter was founded entirely upon whether or not the discrimination was wise to-day, when previous settlements had been on a national basis. There was no questioning the righteousness of discrimination had it been possible to obtain this some distance back in the movement, nor was there any suggestion in our article that the recognition of this new principle in settling gas workers' wages indicated a fresh born idea on the part of the Federation of Gas Employers or their predecessors in the work of negotiation or presentation of the industry's case in arbitration proceedings. Right from the beginning of joint dealing with the matters of wages and hours, not only the differences between undertakings, but differences between districts, have been put forward from the employers' side as factors that should affect the degree of movements of wages. This is not surprising when one considers that half of the 826 statutory undertakings before the war had an annual output of less than 50 million cubic feet, and that probably nearly the whole of the 647 non-statutory works come into the same category.

In all the war-time and *post*-war discussions, the position of small and medium-sized works has had considerable prominence, and been put forward most sympathetically. But all to no purpose until now. The view of the Union representatives of the men has always been against discrimination, and favourable to the matter being dealt with on a national or flat-rate basis. The backbone of their argument for advanced wages has been the increase in the cost of living. But the employers have persistently submitted what is perfectly well known to be the fact, that the cost of living varies as between a town life and a country life. Rent is lower in country areas; and industrious men there are in the position to contribute materially by cultivation to the food requirements of themselves and their families. The town worker is debarred from these opportunities; and rent and living conditions generally are higher for him. Nevertheless, the Unions have ignored all this; and, until the last award, they have succeeded in securing decisions on the flat-rate basis. It is difficult to appreciate this attitude of the Unions, while adopting the cost of living as their main support for securing advances. Workers in large cities and towns are greatly in excess of the workers in small country areas; and it is somewhat curious that the Unions from the first did not claim a distinction in favour of the former. Of course, it can well be seen that the Unions feel pretty safe in retaining their membership in the big centres; and no doubt it is by being able to point to the fact that the workers in the small rural concerns are receiving as much as those in the large undertakings that they are able to retain their adherence. One thing that equality of wage in the different grades of works would do is to keep the workers in the country areas from migrating to the large centres, as they might do if wages there were on a higher scale.

Another argument put forward by the Unions, in favour of flat-rate increases in the gas industry, is that there is equality in the nature of the work. There is not as between works and works, nor as between the different grades of men employed by an undertaking. Actually, it is the work for which they are paid; but naturally the payment must have regard to the cost of living. If the character of the work was the only factor to be considered, it might well be argued that the men employed in the carbonizing operations—from the handling of coal, through the retort-house, to the disposal of the coke—of some of the larger gas-works should be paid less than where there is manual operation all through, as in the small works. The work is lightened immensely in the larger works by mechanical operation and by the vertical retort system. The argument for the flat-rate throughout the country based on equality of work is a bad one, and would not bear investigation. Equality does not exist in works or in men, but only, generally speaking, in regard to time. Nor is it fair to compare the total war and post-war time advances with those made in certain other industrial operations, because the basic pre-war wage was a considerably better one in the gas industry than in certain other industries; and this fact should stand to the credit of the gas industry as the cost of living falls. There is no analogy whatever between the gas industry and (say) the railway workers, because there is no disputing the fact that many railway workers were before the war ill-paid; and yet it was an occupation that was sought after. However one looks at the matter, there has been no justification for advancing the wages of gas workers by equal

measure throughout the country. At the same time, we repeat that the point we were making in our article on the 20th ult. was that, the advances having been made so far on the principle of a national basis, it is difficult to see that any great advantage has been gained by the application, in respect of the last advance, of the principle of discrimination in respect of magnitude of works.

The increase in the cost of living cannot go on indefinitely; and the time of decline will come. The Union leaders are anticipating this. It is at the bottom of the urgency that some Unions are displaying in securing accretions of wages as fast as they can, on the ground of advances in the cost of living. They want as much as possible in hand when they come to argue on the basis of an improvement in the social conditions of the workers, and a larger share in the amenities of life. They are talking this way now. We believe in an improvement in the standard of life for workers. In the gas industry, however, improvement has been growing for many years; but as far as possible such improvement, to the extent that it can be aided by higher pay than before the war, should be based on a co-partnership of interests, which is so easily arranged in the part of the gas industry carried on by private enterprise, the capital in which has never received more than a modest regulated dividend. There is little or no hope of the cost of living ever receding to the old levels. But cost of living has been the basis of the war claims. In any ultimate settlement, cost of living must continue the basis; and an unreasonable shifting on to new ground must not be allowed. In the ultimate settlement, will the eleventh-hour recognition of discrimination in point of magnitude of the works be of any value?

Miners and the Price of Industrial Coal.

The Miners' Federation are giving fresh evidence of their desire to control the coal-mining industry. They want nationalization of the mines and a large share of management, behind which desire many shrewd observers see the grim form of syndicalism. They are now proposing to force on the Government compliance with their views as to how yet-to-be-earned, and therefore uncertain, coal profits should be disposed of; and for once in a way we are partly with the miners, while not, without authentic figures are forthcoming, prepared to go with them to the degree to which they are boldly willing to proceed. Where we are in sympathy with their views is that whatever money the Government have got, or are fairly certain of receiving, in the way of surplus coal profits, should be spread over a reduction in the price of coal not only for domestic and household purposes, but also for industrial uses. This would simplify or ease matters considerably for the coal-selling industry, and all coal-purchasing industries, including the gas industry, whose worst trouble is coal. It would do something to help reduce the production cost of all commodities; and, therefore, it would assist in reducing their price. A uniform reduction in the price of coal would do more to help the gas industry, and lighten its work and burdens, than will the singular notion of making it the distributing agents for a rebate of 10s. on the part of the coal used for domestic gas production. And the capacity it would give it to supply gaseous fuel to industry at a somewhat lower price should tend to the general good of the community. The Miners' Federation do not appear to object to the 10s. reduction in the price of domestic coal; but what they are asking for, and the point they pressed upon the Prime Minister and other Ministers at an interview last Wednesday, is that there should be an immediate and considerable reduction in the price of industrial coal, followed by Government action to reduce the cost of commodities produced by factories. The penalty for any omission in this respect on the part of the Government will be an application from the miners for an increase in their wages. There were other matters introduced by the miners; but this is the one in which we are mainly interested.

Whether it is possible for the Government to comply with the demand depends wholly on the accuracy of estimates which have, however intelligently made, an objectionable habit of going astray—usually in the wrong direction, and more so in these unsettled times than in normal periods. The Government are in possession of certain estimates, upon which they felt justified in making the rebate of 10s. on domestic coal. In order, however, to obtain additional assurance as to the safety or correctness of the estimates, accountants are busy making an investigation; and it is due to this that the Miners' Federation consented to await the accountants' report, and consider it, before continuing their discussion with the Prime Minister and his colleagues. What the Federation suggest is that the estimates upon which the 10s. rebate was made fall far short of what will be the actual position—in other words, that the Government figures are generously under-estimated. The figures deal not with the past but with a year into which we have not penetrated far. Experiences in the coal industry advise great prudence in making estimates entailing liabilities measured by millions; and the country would much prefer in such a matter under-estimates than over-estimates, and a block of adverse liability to be borne at the end of the account year. Working on indefinite supplies and demands, it may well be that the estimates of the Miners' Federation are as generous on the wrong side, as they say the Government estimates fall substantially short of what they should be. However, they are confident that their "birds in the "bush" are as good as in hand. We sincerely hope the Federation estimates will prove correct; but we should not like to risk asserting they will be so. In figures given by Sir Auckland Geddes, he reckons that in the present year the coal output will be 217 million tons; the Miners' Federation indicate a confidence that it will be 231 million tons. This is hopeful. But, if transport will admit, why not 287 million tons as in 1913? Transport ought to constitute the only drawback to a restoration of the old output, because the case of the Miners' Federation before the Coal Commission was that the reduction of miners' hours would enable them to put more energy into their work, and so production would not suffer. Theory and practice in this instance have proved irreconcilables. However, the President of the Board of Trade calculates that, on his output estimate, the cost of production would be 26s. 0½d. per ton the Miners' Federation calculate, on theirs, that it will be 24s. 9d. The former considers that the exports of coal will be reduced from 34 to 23 million tons; while the latter point out that the exports so far this year have been at the rate of 44,316,408 tons per annum. Sir Auckland computes that the average price for export coal will be 35s. per ton; whereas the miners submit that its average price from August to December was £2 15s. 9d. On these unstable factors, the Federation hold that the net surplus profit on coal at the end of the year will be £54,000,000; whereas the Board of Trade put it at £39,106,163. In this matter, we prefer the side of moderation; there is less danger.

The whole country will look to the Federation doing their part to justify during the year the production figures they have now put forward. To enable them to do so, there is plenty of scope between the existing production and the 1913 output. As to the allocation of profits (if there are any to spare) to a reduction in the price of coal to industry, in order that production may be cheapened and the cost of living reduced, further comment may be deferred until the Government investigation declares whether or not a greater surplus than was formerly predicted may be anticipated.

The South Metropolitan Position.

The report and accounts of the South Metropolitan Gas Company are referred to on a later page. We have not had an opportunity of examining them for the purpose of editorial comment; but the omission this week will be made good next. The Company have been selling gas during the half year at for the three summer months 4s. 4d., and for the three autumn and winter months at 4s. 8d.; and the income enables the Directors to pay the temporary statutory dividend of 3 p.ct., and to carry forward only £17,964. This is a lean carry-forward, and shows that the Company (as is their custom) have been in the price charged for gas working on very fine-cut estimates. Every line of the report tells a tale. This is the announcement that the amount now paid in wages has reached a figure in excess of pre-war payments of 1 million sterling. This is something for the consumers and proprietors to contemplate—consumers who are paying 4s. 8d. per 1000 c.ft., and proprietors who are receiving 3 p.ct. dividend, which the Chairman (Dr. Charles Carpenter) avers is "unlikely" to attract the capital needed for the extension of gas undertakings. There is no hesitation in emphatically agreeing as to the unlikelihood of fresh investors (without there is considerable amendment) committing to any extent capital to an industry the statutory restrictions upon which have "let down" to such an extent the capital already invested in it.

The report alludes to the Bill the Company are promoting, and which the Directors believe provides a fairer basis for distributing surplus profits among the three partners. This is a matter that has been discussed in the "JOURNAL." It is a healthy sign to see the gas business has grown by more than one-eighth in comparison with the corresponding period of 1918. The work connected with the plant for eliminating carbon bisulphide has been resumed. Not much has been heard of it for some time; and engineers have been asking whether anything unfortunate had happened for a cloak of silence to have almost suddenly developed about the plant.

Return on Capital and the Altered Value of Money.

The Chairmen of the London Profiteering Committees, at a conference last Thursday, passed a number of resolutions suggesting the amendment of the Profiteering Act in various particulars; and the resolutions are to be sent to the President of the Board of Trade. The Act does not interest the gas industry much, because gas undertakings cannot be "profiteers" even if so disposed, which they are not. But there is one of the resolutions which should be noted by those having in hand the proposals for the revision of the financial terms on which the industry conducts its business. It reads: "That the return of real capital at the altered value of money be taken into consideration when an inquiry as to reasonable profits is being made."

Labour and the Cost of Living.

There is confidence now that prices of commodities will permanently remain at a higher level than in 1914, due largely to rises in wages. The Trade Unions continue to ask for more and more additions to wages, and at the same time are threatening the Government with all sorts of penalties if the cost of living does not descend. Every time, however, there is an addition to wages without a compensating increase in the production of the workers, conditions are created tending to force still higher the cost of living. The workers themselves are therefore largely responsible for the condition of things over which they are so loud in complaint. The gas industry is heavily interested in transport; and the transport workers are now asking for a further 10s. advance. Some 100,000 men employed in commercial road transport are affected. Soon after the standardization of wages question was settled for railwaymen, a prominent official of the Amalgamated Society of Locomotive Engineers and Firemen stated that in all probability the members would consider that their wage position should be further improved in relation to the pay of the other grades of railwaymen. Thus the labour wheels are forced round; the cost of living goes higher and higher; and the men in the end do not appear to be any better off. Of course, we are not so foolish as to blame labour wholly for the high cost of living; but labour is now pushing-up the cost of living, against itself. The trouble is that many trade unionists will not see, or pretend they do not see, the genuineness of this elementary fact in our economic position.

Shall Prepayment Installations Cease?

A startling suggestion was made by Mr. James M'Ghee, of Glasgow, in the course of a paper published last week (p. 192). "Should the gas industry," he asked, "go on installing prepayment meters?" His serious discussion of the matter indicates that he inclines to the view that they should cease utilizing this means of extending the base of the industry. We say with a great deal of assurance that, notwithstanding the points he puts forward, he will not find many men in the industry prepared to reply in the negative. He submits that the initial cost of the prepayment meters is more than that of ordinary meters, the cost of repairs is more, and the surveying costs are more. All this is admitted, and it always was from the inception of the system. Costs have gone up; so have the costs of ordinary meters. But the prepayment consumer must to-day pay more for the service, the same as he is paying more for all other things he requires and purchases. Promoters of Bills in Parliament are providing for the additional expense. If cessation of service there is to be, it must come from the prepayment consumer himself. If he is willing to meet the extra cost, he ought not to be deprived of the convenience he finds in being able to pay for the service as he goes along. The gas industry has tapped a source of custom which the electricians cannot tap, though they may scratch about the surface. There is no analogy between what the electricity people are doing and what the gas industry is doing. The former have not obtained, nor are they likely to obtain, the custom to any extent of the working classes; their business is with other people. Mr. M'Ghee is of opinion, so we understand him, that working class consumers could be secured with ordinary meters equally as well as with prepayment meters. There may have been success in this way in some cases, but they are few. The almost universal experience is that the ordinary meter is not the best means of realizing this custom; and the probability is that a considerable amount of bad debts would be incurred through the running-up of accounts. Mr. M'Ghee does not go so far as to suggest that the existing prepayment meters should be scrapped; but the tendency of his question and remarks is that no fresh installations should be made. It is bad strategy to give up any territory that has been won in business, so long as there is profit in it. The best means of getting and keeping new business must be resorted to; and the general opinion will be that the prepayment meter as a means to a profitable end is not played out.

Professional Workers and Federation.

A letter in our "Correspondence" columns to-day suggests that the National Association of Technical Gas Officials should break down the bar to membership of other gas officials that the use of the word "technical" introduces. The writer holds that there is existing a big reservoir from which, by admitting other gas officials, can be drawn support in more ways than that obtained by subscription. Perhaps the Association will consider the matter, and let us have their views for publication. Meanwhile, attention may be directed to a proposal to bring about a federation of organizations constituted of the professional and supervisory classes. There is to be a conference to discuss the idea, which has arisen from the emphasis given recently to the special problems and difficulties of administrative and clerical workers due to the rise in the cost of living. There has already been some discussion; and it appears from it (to quote the official statement) that "the present position of the technicians and supervisors of industry, and in general of all professional workers, demands some form of common action which would at once safeguard their special interests, and also provide means of promoting friendly relations between them and the industrial workers' organizations. It is also felt that by means of federation the various professional societies would be enabled to formulate and make effective their distinctive contributions to questions of industrial control." The conference to form a national federation of professional, technical, and supervisory workers will be held at Essex Hall next Saturday. A number of unions and professional societies have been invited to send delegates, embracing the following branches of professional organization: Engineering, electricity, transport, mining, banking, insurance, law, journalism, stage, clerical, commercial, and chemical.

OBITUARY.

The death has taken place at Padiham, at the age of 81, of Mr. JOSEPH R. SMITH, who until 1901 held the dual position of Clerk and Gas Manager to the Padiham Urban District Council. The gas-works when Mr. Smith took office were old and obsolete; and he frequently urged that the Council should embark on a new gas-works scheme. But his proposal was persistently opposed, on the ground that gas was likely to be superseded by electricity as an illuminant. It was not until Mr. Smith left the Council's service that the present works were erected. His son, Mr. James Smith, is Gas and Electrical Engineer at Colwyn Bay,

PERSONAL.

The position of Chief Engineer to the Danish Gas Company, of which Mr. Alfred W. Edwards is Chairman and General Manager (advertised in the "JOURNAL" a few weeks ago), has been filled by the appointment of Mr. H. H. COLLETT, of the Meadow Lane Gas-Works, Leeds. Mr. Collett was educated at Fartown Grammar School, Huddersfield, and at Wesley College, Sheffield. After serving a three years' apprenticeship with Messrs. Kendall and Gent, of Manchester, he went to the Whessoe Foundry, Ltd., of Darlington, in whose drawing office he gained valuable experience in all kinds of gas plant and constructional steelwork. In 1906, Mr. Collett was appointed Chief Draughtsman to Mr. Charles Dru Drury, the Engineer of the Sunderland Gas Company, under whose supervision he carried out all the designs, drawings, specifications, &c., for the complete reconstruction of the Company's

Ayres Quay works, which included the first installation of intermittent vertical retorts to be erected and worked in this country. In 1909—before gas manufacture was recommenced at the new works—Mr. Collett was appointed Manager, and occupied that position until 1914, when he moved to Leeds as Manager of the Meadow Lane station of the Leeds Corporation Gas Department, which position he is now relinquishing to take up his new duties in Copenhagen. While at Sunderland and Leeds, Mr. Collett has carried out a large amount of reconstruction work, involving an outlay of over £120,000; and at Leeds he has had to deal with the supply of coke-oven gas from the inauguration of the scheme. At Meadow Lane, Leeds, the plant includes vertical and inclined retorts, producing 5 million c.ft. of gas per day, telpher plant, a turbo-exhauster, carburetted water gas plant for 5 million c.ft. per day, a high-pressure gas installation, and other subsidiary buildings and plant.

Mr. ARTHUR VALON, M.Inst.C.E., of No. 5, Victoria Street, has been appointed Secretary (as from June 30 next) of the Institution of Water Engineers, in succession to Mr. PERCY GRIFFITH, M.Inst.C.E., F.G.S., who has occupied the position for twenty years. Mr. Griffith (who is resigning in order to devote more time to his private practice) has been appointed Consulting Gas Engineer to the Second Garden City, Ltd.

Mr. HERBERT N. CLARKE has been appointed Distribution Superintendent to the Romford Gas and Coke Company, Ltd., in terms of the advertisement which appeared in the "JOURNAL" last month.

At a meeting of the Birmingham Corporation Gas Committee last Tuesday, the resignation of Dr. E. W. SMITH, Chief Works Chemist, was received. It was stated that he had obtained an important appointment in London. Dr. Smith has during his residence in Birmingham taken great interest in the work of the chemical and gas engineering societies, and has frequently read papers. He is Chairman of the Birmingham branch of the Institute of Chemists.

Mr. E. H. W. COOKE, the Chief Accountant to the Birmingham Corporation Gas Department, has been appointed to a like position with the Metropolitan-Vickers Electrical Company, of Trafford, Manchester. He had been in the service of the Gas Department for thirty years, and in recent times had performed important national work, including the tabulation of the population of Birmingham for the purposes of the National Register. He also carried out the work of Chief Registration Officer to the local Food Control Committee. He is a popular and much-respected official. Mr. Cooke's resignation was formally accepted by the Gas Committee on Tuesday last.

Prior to leaving Blackburn to take up his duties as Gas Engineer to the Glasgow Corporation, Mr. J. W. M'LUSKY was the recipient of tokens of esteem from the staff and employees at the Blackburn Gas-Works. The presentation was made on Monday evening of last week, at the Town Hall, and took the form of a silver fruit and cake stand and a pair of silver flower vases. The ceremony was performed by Mr. Ernest Hamer, the Chairman of the Gas Committee, whose expressions of regret at Mr. M'Lusky's departure, and appreciation of his services, were endorsed by Mr. J. W. Forrest and Mr. J. Holden, the Superintendent of the Addison Street Gas-Works. Mr. G. P. MITCHELL, the new Gas Engineer, took up his duties at Blackburn last Tuesday morning.

Mr. LAURENCE FARQUHAR, whose appointment as Manager of the Grangemouth Gas-Works was intimated last week, was demobilized in March of last year. He has been for four years Assistant to Mr. J. W. Napier, of Alloa. Previous to that, he was engaged in the engineering shops in the Edinburgh and Leith Corporations Gas-Works at Granton. While at Alloa he had the opportunity of supervising, under Mr. Napier, the erection of a vertical retort installation. Mr. Farquhar, during his apprenticeship, attended the "Gas" courses held in the Heriot Watt College, Edinburgh, and was medallist for Gas Manufacture and Gas Distribution. At present he is lecturer at the College on these subjects. Joining the Colours in July, 1915, Mr. Farquhar saw service in France as Second-Lieutenant with the Cameron Highlanders. He was wounded, and subsequently transferred to the Machine Gun Corps, with which he was Acting Captain and Assistant Adjutant when hostilities ceased. He is President of the Scottish Junior Gas Association (Eastern District).

The part which engineers will be called upon to play in the great work of reconstruction was referred to by Sir John P. Griffith, President of the Institution of Civil Engineers, replying to the principal toast at the annual dinner of the Birmingham Students' Association. In the face of the immense increase in wages, he said, a greater output must be looked for; and those who would be prominent in the profession in the future must give the workmen the means and the power to turn out more work. He believed that gradually the leaders of labour would come to realize that nothing but increased output would lead to prosperity. They might have increased wages, and increased prices of material, but they would only be turning in a vicious circle unless increased output were obtained. It was principally to the students now engaged in engineering that the country would turn in the immense work of reconstruction, and the solution of great problems hidden away in the future.

GAS LIGHT AND COKE COMPANY.

Annual Report and Accounts.

THE following is the report of the Directors of the Gas Light and Coke Company for the year ended Dec. 31, which will be presented at the ordinary general meeting next Friday.

The accounts for the year show that, after providing for the payment of 3 p.ct. per annum on the ordinary stock for the June half year and of £2 13s. 4d. and £2 12s. 6d. p.ct. per annum respectively on the 3½ p.ct. maximum stock for the June and December half years, and allowing for fixed charges, there is a total available balance of £568,455 12s. 8d., out of which the Directors recommend the payment of a dividend on the ordinary stock for the December half year at the rate of 3 p.ct. per annum, which will absorb £244,484 12s. 6d., and leave £323,971 0s. 2d. to be carried forward to the credit of the current year.

The dividend of 3 p.ct. per annum on the ordinary stock for the June and December half years is payable under the Statutory Undertakings (Temporary Increase of Charges) Act, 1918; also the dividend of £2 12s. 6d. p.ct. per annum on the 3½ p.ct. maximum stock for the December half year.

Compared with the corresponding periods in 1918, the sale of gas for the June half year showed an increase of 10 p.ct.; for the December half year of 21½ p.ct.—resulting in an increase for the year of 15½ p.ct.

At the end of the March quarter, owing to a reduction in the price of oil and cost of freights, the Directors were glad to be able to reduce the price of gas from 4s. 4d. to 4s. 2d.; and for six months gas was supplied at that figure. Unfortunately however—due chiefly to the increase of 6s. in the price of coal (which affected all deliveries of coal made on and after July 21 last)—they were forced to raise the price to 4s. 8d. in October.

There has been an addition during the year to the number of consumers of 6131. Owing to the large increases in the cost of materials and labour, and the fact that the Company were losing heavily on the hire of stoves, the Directors felt that they had no alternative but to raise the charge for hire by 50 p.ct., at the same time giving notice to consumers that they were prepared to sell the stoves to them at a reasonable figure. The Directors are pleased to report that a large number of consumers have availed themselves of this offer.

In November last, the Government decided that the price of coal used in the manufacture of gas required for domestic purposes should be reduced by 10s. per ton on all deliveries as from the 1st of December, and that this reduction in the price of coal was to be given as a rebate on the price of gas supplied for domestic consumption. The Directors are arranging to grant a rebate in the price of gas consumed during the current March quarter in accordance with the Board of Trade regulations.

The Government have promised to introduce a Public Bill during the coming session of Parliament to deal with the financial position of gas undertakings generally; and it is hoped that the shareholders of this Company will then obtain much-needed relief.

The number of the Company's employees who joined His Majesty's Forces, as far as is known, was 5363, of whom 60 are known to have been awarded distinctions, and 76 to have obtained commissions. The number of those who were killed or died on active service was 506. With the exception of some 400 men who are still serving with the colours, all have now been demobilized, and, as promised, employment has been found for all who desired to return to the Company's service.

DAVID MILNE WATSON, *Governor.*

Horseferry Road, Westminster, S.W., Jan. 21, 1920.

The Accounts.

The statement of capital (stock) sets forth that the total paid-up is £10,413,480; added on conversion, £12,832,955—total amount authorized, £23,246,435. Deducting the amount redeemed, £285,225, the total amount of the Company's existing capital powers is £22,961,210. The statement of loan capital stands thus: Total paid up, £3,186,660; added on conversion, £1,618,190; unissued, £750,000—total amount authorized, £5,554,850.

The capital account shows receipts (with premiums, £1,688,958) to the amount of £29,455,017. The expenditure is shown in the following items:

Expenditure to Dec. 31, 1918			£14,521,974 16 6
Expenditure during the year to Dec. 31, 1919—viz.:			
Buildings and machinery in extension of works	£247,773 11 3		
New and additional mains and service-pipes	64,543 16 4		
Do. do. meters	24,936 14 9		
Do. do. stoves	55,623 5 4		
		392,877 7 8	
		£14,914,852 4 2	
By sale of surplus land	£11,801 9 9		
„ amount written off plant	2,500 0 0		
„ stoves sold	137,053 8 2		
„ depreciation of meters and stoves	130,358 0 0		
		281,712 17 11	
Total expenditure		£14,633,139 6 3	
Nominal amount added on conversion		14,451,145 0 0	
		£29,084,284 6 3	
Deduct amount of capital redeemed under Company's Act of 1903		285,225 0 0	
		£28,799,059 6 3	
Balance of capital account		655,958 8 5	
		£29,455,017 14 8	

The total of the net revenue account is £1,230,608. The following statement shows how it is proposed to appropriate it :

Year, 1918.			
£153,245	..	Interest on debenture stocks and bonds for the year	£153,245 10 0
162,489	..	Dividend on the 4 p.ct. consolidated preference stock for the year, £162,489 8s.	
80,167	..	Dividend on the 3½ p.ct. maximum stock for the year, £68,791 13s. 4d.	231,281 1 4
242,656			
40,961	..	Interest on temporary loans and sundry funds, *less* credits	33,141 10 3
£2 18s. 8d. p. ct.)		Dividend on the ordinary stock June half year, 1919 (3 p.ct.)	244,484 12 6
239,052			
625,229	..	Balance applicable to dividend on ordinary stock December half year, 1919	568,455 12 8
£1,301,143			£1,230,608 6 9

The three statements relating to the reserve, special purposes, and depreciation funds stood as follows on Dec. 31 : Reserve fund, £85,441 ; special purposes fund, £362,898 ; depreciation fund, £95,254.

REVENUE ACCOUNT.

Expenditure.

Year, 1918.		£ s. d.	£ s. d.
£3,154,672	Manufacture of gas— Coal, including all expenses thereon	4,033,769 9 4	
277,756	Oil ,, less value of oil tar	382,879 7 2	
240,922	Coke, &c., used in the manufacture of carburetted water gas	335,022 1 5	
35,007	Salaries of engineers and other officers at works	50,500 9 10	
396,099	Wages	538,760 11 2	
55,298	Purification	59,252 6 3	
862,282	Repair and maintenance of works and plant, materials and labour, less received for old materials, £23,641 10s. 2d.	1,408,955 2 2	
	Distribution of gas—		6,809 139 7 1
180,908	Salaries and wages of officers (including rental clerks)	250,522 2 8	
224,904	Repair and maintenance of mains and service-pipes, &c.	377,205 9 3	
248,963	Repair and renewal of meters	292,347 17 11	
206,158	,, ,, stoves	300,544 16 2	
9,862	Fitting up automatic meter supplies	18,344 16 7	
			1,238,965 12 7
71,341	Public lamps—lighting and repairing	..	118,996 15 8
	Rents, rates, and taxes—		
15,345	Rents payable	15,361 11 4	
409,2 8	Rates and taxes	446,379 14 5	
	Management—		461,741 5 9
7,500	Directors' allowance	7,500 0 0	
604	Company's Auditors and Assistant	600 0 0	
23,386	Salaries of management staff	33,004 16 8	
90,945	Collectors and cashiers	128,271 10 5	
17,604	Stationery and printing	21,514 16 11	
19,432	General charges	26,451 5 11	
			217,342 9 11
40,000	Co-partnership	..	36,439 3 2
1,461	Parliamentary charges	..	1,252 14 6
1,634	Law charges	..	433 11 1
6,828	Bad debts	..	6,692 6 2
1,000	Depreciation fund for works on leasehold lands	..	1,000 0 0
55,705	Annuities to officers and workmen, including contribution to officers' superannuation fund	..	8,421 11 7
16,614	Allowances to employees on active service	..	4,832 6 6
7,477	Workmen's compensation	..	6,930 0 11
8,559	Company's Contribution under National Insurance Act, 1911	..	10,377 12 11
	Public officers—		
2,104	Gas Referees and Official Auditor	1,531 7 10	
1,127	Public testing-stations	1,168 3 4	
			2,699 11 2
6,690,745			9,004,164 9 3
1,050,099	Balance carried to net revenue account		849,864 5 9
7,740,844			9,854,028 15 0

Total Wages Paid, 1919 £2,605,779 0 8 Total Salaries Paid 1919. £317,977 11 11
1918 £1,862,194 8 4 1918. £221,511 4 8
1913 £1,064,079 4 3 1913. £190,65[illegible] 16 8

Revenue.

Year, 1918.		£ s. d.	£ s. d.
	Sale of gas— Per meter at 4s. 4d., 4s. 2d., and 4s. 8d.		
£5,198,772	per 1000 cubic feet	6,403,357 17 4	
105,863	Public lighting and under contracts	124,769 7 1	
5,304,635			6,528,127 4 5
160,542	Rental of meters	..	160,612 6 11
185,278	Rental of stoves	..	191,865 17 2
150,747	Rental of fittings	..	235,588 0 1
	Residual products—		
1,272,740	Coke, less labour, &c.	2,023,667 6 7	
41,885	Breeze, less ,, ,,	96,847 13 2	
358,832	Tar and tar products	310,553 15 9	
249,658	Ammoniacal liquor and sulphate of ammonia	290,403 15 1	
1,923,115			2,721,472 10 7
16,113	Rents receivable		15,841 11 10
442	Transfer fees		521 4 0
7,740,844			9,854,028 15 0

The remaining statement is the balance-sheet, which gives the value of the stores on hand at the close of the year as follows : Coal, £274,218 ; gas oil, £88,701 ; coke, £60,896 ; tar and ammoniacal liquor and products, £146,419 ; and sundries, £639,644. The figures this time last year were : Coal, £434,840 ; gas oil, £286,266 ; coke, £48,961 ; tar, ammoniacal liquor, and products, £131,356 ; sundries, £601,679.

Statement of Coal.

—	In Store Dec. 31, 1918.	Received During Year.	Carbonized During Year.	Used During Year.	In Store Dec. 31, 1919.
	Tons.	Tons.	Tons.	Tons.	Tons.
Coal	236,112	2,014,071	2,082,059*	3389	164,735

* In addition to this quantity of coal, 7,191,076 gallons of oil have been used during the year.

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold. Public Lights and Under Contracts (Estimated).	Private Lights (per Meter).	Total Quantity Accounted for.	Number of Public Lamps.
Thousands.	Thousands.	Thousands.	Thousands.	
* 33,255,720	721,934	29,786,955	30,995,222	44,543
† 29,210,083	569,528	25,849,218	26,866,835	44,524

* Including 7,853,436,000 c.ft. of carburetted, &c., water gas. † Year 1918.

Statement of Residual Products.

Description.	In Store Dec. 31, 1918.	Made During Year.	Used During Year.	Sold During Year.	In Store, Dec. 31, 1919.
Coke—tons	31,267	1,290,563	222,386	1,069,095	30,349
Breeze—tons	140,667	220,307	42,963	233,688	84,323
Tar, from coal only—galls.	1,884,036	19,047,810	18,963,576	9,483	1,958,787
Ammoniacal liquor—butts	28,062	524,224	524,377	..	27,909

Period Styles in Gas Lighting Fittings.

From the most remote time, says the "American Gas Engineering Journal," the styles of lighting equipment have followed closely the character, customs, and environment of the various peoples, and have corresponded in growth to the development of their civilization and refinement, the skill of their workmen, and the use of improved tools, as well as the employment of a variety of materials. No new style has ever been created without some knowledge of an older period type, and probably none ever will be. The wide variety of materials available, and the many splendid examples of ornamental design in the possession of the artists of to-day, make the development of more artistic lighting equipment a certainty. A visit to studios devoted to the designing of lighting fixtures—more especially of the residential type—discloses the fact that the general forms of candelabra, wall-bracket, or chandelier follow closely the older examples of lighting methods; while the ornamentation may easily be traced to the period styles of architecture, furniture, &c. The student of period styles may delve into the mysteries of design as deeply as he may desire, and always find something interesting and instructive. Salesmen, dealers, and purchasers must be able to obtain the information necessary to understand harmony in furnishings, and appreciate the actual excellence of the materials offered. The most persuasive kind of reasoning to-day is that which is based on the solid foundation of actual excellence.

The Burdon Oil-Gas System.

Photographs of the Burdon oil-gas system applied to a high-temperature billet-heating furnace and to a low-temperature furnace for plate-heating appear, with some particulars of the process, in the "Iron and Coal Trades Review." There are material differences between this system and others now upon the market. In the earlier form of the Burdon plant, which was designed for burning light oils only, the oil fuel is first very finely atomized, and intimately mixed with a large volume of low-pressure air; the mixture being then converted into gas in a small retort attached to the furnace—thus not only ensuring complete combustion of the fuel, but, by a simple adjustment of the air, enabling a bunsen flame to be obtained, if one was desired. For the heavier mixtures since suggested, however, it was necessary to modify the arrangement; and in an improved form of the apparatus it is said to be possible to burn, with a high degree of economy, all forms of liquid fuel, from the lightest to the heaviest oils—the only required condition being that the fuel shall be capable of flowing by gravitation. The essential difference is that, whereas by the former method the oil was gasified in a retort together with the required air, in the new system the air only is pre-heated—the oil being led by gravity to the carburettor, where it mixes with, and is gasified by, the highly-heated air. With these furnaces, it is stated that the possible temperature attainable appears to be limited only by the melting-point of the furnace-bricks. One furnace, designed for melting charges up to 4 cwt., was seen fired with creosote oil, with a uniform output of one melt per hour, and a fuel consumption of 4 gallons per hour. The furnace will, however, without alteration, burn any mixture capable of flowing through the feed-pipes. Very little attention is required; the fuel feed, when once adjusted for a particular operation, being entirely automatic.

SOUTH METROPOLITAN GAS COMPANY.

Half-Yearly Report and Accounts.

THE following is the report of the Directors of the South Metropolitan Gas Company for the six months ended Dec. 31, which will be presented at the half-yearly meeting on the 11th inst.

After payment of interest and fixed charges, and providing for the temporary statutory dividend at the rate of £3 p.ct. per annum on the ordinary stock, there remains a surplus for the half year of £17,964. Such a dividend is unlikely to attract the capital needed for the extension of gas undertakings.

The amount paid on account of wages has now reached a figure amounting to one million pounds per annum above the pre-war figure.

The work interrupted by the outbreak of hostilities, of adapting the purifying system so as to eliminate the carbon bisulphide impurity, has been resumed.

The increase in the sale of gas amounted in the half year to 12·9 p.ct. over the corresponding period of 1918.

A Bill has been deposited for applying to the Company's operations the method of charging for gas on the basis of its heating value, as recommended by the "Beilby" report. In conjunction therewith, the opportunity has been taken of submitting—in substitution for the present sliding scale—provisions which, while safeguarding the interests of consumers, stockholders, and employees, would provide a fairer basis for distributing any surplus profits among these three partners. The consent of the proprietors to these proposals will be asked at the extraordinary meeting following the ordinary meeting, as well as to a modification of the existing machinery by which a share in the management is given to the employees.

Mr. Thomas Roberts has been elected an Employees' Director, in place of Mr. Joseph Newbold, who has retired from the Company's service.

Two Directors (Mr. Kenneth Phipson Hawksley and Mr. Frank Harding Jones) and one Auditor (Mr. Charles Pelham Crookenden, F.C.A.) retire by rotation. They are eligible and offer themselves for re-election.

CHARLES CARPENTER, *Chairman.*

Offices: 709, *Old Kent Road, S.E.,*
Jan. 26, 1920.

The Accounts.

The following are the principal portions of the accounts accompanying the report:

The first two statements relate, as usual, to the stock and loan capital. The former sets forth that the standard rate of 4 p.ct. is payable on £6,011,224 and £598,671 (Act of 1901, as amended by the Act of 1916) stock. The amount of 5 p.ct. preference stock under the 1916 Act is £250,000. The loan capital account shows that the loan capital, the rate of interest on which is 3 p.ct., amounts to £1,798,994 and £96,451 (Act of 1901, as amended by the Act of 1916). The amount, at 5 p.ct., under the Act of 1916 is £500,000. The third statement is the capital account. It stands as follows: Amount received, £6,211,816; nominal amount added by conversion (less premium), £3,043,524—total, £9,255,340. The items of expenditure are as follows:

Capital account to June 30, 1919		£5,534,474 0 6
Expenditure during half year to Dec. 31, 1919—viz.:		
New buildings and machinery	£30,111 2 8	
New and additional mains and services	1,623 6 1	
New and additional meters	4,614 7 0	
New and additional stoves	4,566 16 6	
		40,915 12 3
Total expenditure		£5,575,389 12 9
Balance		636,426 13 6
		£6,211,816 6 3
Nominal amount added by conversion, less premium		3,043,523 13 9
Total		£9,255,340 0 0

The net revenue account shows a sum of £129,996 applicable to dividend. The balances of the reserve, renewal, and insurance funds stood as follows on June 30 last: Reserve fund, £131,996; renewal fund, £36,203; insurance fund, £88,937.

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, £358,668; coke and breeze, £30,282; tar, ammonia, and products, £279,070; and sundry plant and stores, £313,097. The figures this time last year were: Coal, £289,300; coke and breeze, £66,586; tar, ammonia, and products, £221,096; and sundry plant and stores, £308,664. A sum of £67,929, co-partnership bonuses and savings, has been deposited with the Company; and the total of the superannuation and guarantee funds is £188,568.

Statement of Coal.

In Store June 30, 1919.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store Dec. 31, 1919.
Tons. 112,459	Tons. 657,160	Tons. 588,496	Tons 2093	Tons. 179,030

The following is the revenue account:

EXPENDITURE.

Manufacture of gas—		
Coal into store, including £4484 6s. 10d. for London Port and tonnage dues	£1,183,185 6 11	
Purification	36,349 5 8	
Salaries of Engineer and Officers at works	38,785 17 11	
Wages (carbonizing)	110,023 8 6	
Repairs and maintenance of works and plant, less £14,743 18s. 3d. received for old materials	367,846 18 11	
		£1,736,190 17 11
Co-partnership		..
Distribution of gas—		
Repair, maintenance, and renewal of mains and service-pipes	£78,632 6 11	
Salaries and wages of officers, including rental clerks	47,910 16 5	
Repair and renewals of meters	68,872 18 9	
Repair and renewals of stoves	74,979 10 8	
Repair and renewals of gas-fittings	67,482 13 5	
		337,878 6 2
Public lamps, labour and materials £29,729 3s. 11d., less £18,968 13s. 7d. received for the same		10,760 10 4
Rents, rates, and taxes—		
Rents payable	£1,514 11 10	
Rates and taxes	58,345 8 8	
		59,860 0 6
Management—		
Directors' allowance	£2,871 10 0	
Salaries of Secretary, Accountant, and clerks	7,551 10 6	
Collectors { Ordinary	8,986 4 11	
Collectors { Slot meter	32,801 9 0	
Stationery and printing	11,246 12 6	
General charges	14,281 4 3	
Company's Auditors	75 0 0	
		77,813 11 2
Miscellaneous—		
Law charges		360 19 1
Parliamentary charges		1,147 10 5
Bad debts		570 9 0
Stolen from 241 slot meters broken open		137 6 6
Superannuation, sick, and accident funds		20,442 8 5
National Insurance Act charges		5,396 0 1
Gas Referees and Official Auditor		220 9 2
Leasehold renewal fund		1,000 0 0
War Fund		1,413 13 10
Total expenditure		£2,253,192 2 7
Balance carried to net revenue account		188,220 12 2
		£2,441,412 14 9

RECEIPTS.

Sale of gas—		
Michaelmas at 4s. 4d. per 1000 c.ft.	£569,490 10 7	
Christmas at 4s. 8d. per 1000 c.ft.	878,723 15 6	
	£1,448,214 6 1	
Public lighting	23,794 13 7	
		1,472,008 19 8
Meters at rent	£60,183 2 10	
Stoves and fires at rent	42,463 9 5	
Gas-fittings at rent	55,572 9 6	
		158,219 1 9
Residual products—		
Coke	£609,672 14 1	
Breeze	9,508 3 8	
Tar and tar products	85,798 11 5	
Ammonia and products	104,582 10 10	
		809,562 0 0
Rents receivable		1,552 13 4
Transfer fees		70 0 0
Total receipts		£2,441,412 14 9

Total amount paid in salaries for half year, £81,394 8s. 0d.
" " " wages " £812,592 1s. 0d.

Statement of Residual Products.

Description.	In Store June 30, 1919.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store Dec. 31, 1919.
Coke—tons	22,955	360,956	71,184	295,996	16,731
Breeze—tons	924	47,820	24,647	22,471	1,626
Tar—gallons	526,092	5,349,760	5,314,307	3,456	558,089
Ammoniacal liquor—butts	8,631	205,298	202,584	..	11,345

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights (estimated).	Private Lights (per Meter).		
Thousands. 7,306,141	Thousands. 136,961	Thousands. 6,555,470	Thousands. 6,789,236	24,842

The debate between representative members of the Midland Junior Gas Association and the South Midland Centre of Electrical Engineers, at the Birmingham Council House, on Thursday, on the subject of the "Uses of Gas and Electricity," will be opened by Dr. E. W. Smith, the Chief Chemist of the Birmingham Gas Department, who will deal with the utilization of fuel for the generation of power. The case for electricity will be submitted by Mr. F. Forest. Dr. C. M. Walter, of the Industrial Research Laboratory of the Birmingham Gas Department, will speak on the industrial application of gas and electricity—furnaces in particular; and Mr. E. J. Moffatt, B.A., will present the claims of electricity. Other matters to be discussed in the debate will include domestic appliances and the transmission or distribution of power; and the discussion will be wound-up by Dr. Smith and Mr. C. C. Garrard, Ph.D. Mr. Marks (of the Birmingham Electricity Supply Committee) will preside.

ELECTRICITY SUPPLY MEMORANDA.

THE rebate of 10s. per ton on the coal used for generating electricity is causing electric undertakings some amount of trouble; and they are not altogether pleased over being made by the Government the agents for the distribution of the 10s. Yet it should, were the allowance sufficiently impressive, have some commercial value; for in these days when every householder and his family are paying through the nose for all commodities, it will not be unpleasant to find a deduction made from his electricity accounts, irrespective of the source from which it is derived. But for domestic purposes, the sum will be a small one. Some domestic consumers of electricity for lighting only will want a microscope to see the deduction. If the householder is a customer of an undertaking that sells 500 units per ton of coal carbonized, he will find (the 10s. is subject to 5 p.ct. reduction for expenses) an allowance on his account of the handsome sum of 0·228d. per unit used. If his consumption amounts to 50 units in the quarter, it would represent 11·4d. This is trivial. And a humorous thing is that the less efficient the undertaking is on the lines of calculation, the greater will be the allowance to the consumer. We do not dispute his right to it, as the less efficient an undertaking the more costly is the electricity per unit. But still there is the fact. If an undertaking sells 600 units per ton of coal, the householder would get 0·19d. per unit; if only 300 units, he would receive 0·38d., or twice as much. This indicates how great a part capital, distribution, and general charges (apart from fuel) take in making the total that has to be charged for electricity. Our friend the "Electrical Review" thinks that the electric undertakings will, through the allowance, be exposed to endless criticism and misunderstanding. We should not be at all surprised. It is almost despondent over the matter. "There is no way," it says, "of showing a consumer that he is being treated properly as regards the amount of his allowance. Consumers will get different rebates according to the company or municipality which is supplying them. The amount will be quite trivial compared with the great trouble given. In many cases, the rebate will probably be less than a farthing per unit." We sympathize with the "Review." Of course, consumers will get different rebates, according to the local conditions of supply and the degree of efficiency—or inefficiency—of the undertaking.

The Trivial "Allowance."

Electricity's Fuel Requirements.

"We are faced by a mischievous movement with an entirely selfish object; and we must be careful of playing into the hands of such people." So writes "Meteor" in the "Electrical Times." The "mischievous movement" is to secure national economy by ensuring the burning under steam-boilers of fuel from which valuable products have been extracted which contribute to the national economy; and "such people" we take it are scientists and the men of the gas industry who have been urging that those products shall not be destroyed under steam-boilers if they can be economically saved. And the gas industry says that they can be; and its work proves it. The Nitrogen Products Committee have (as was seen in the "Memoranda" and our editorial columns last week) been reporting upon the question of the electricity industry introducing carbonization and bye-product recovery as a prelude to electricity generation; and their warning to the industry to keep clear of this is, we assume, the cause of "Meteor's" perturbed mind. He must not blame the gas interests for conclusions reached by a Committee composed of members largely independent of the industry; but evidently he seems to think it is the moving spirit in the matter. He admits that, if no other sources of energy are to be opened to the electricity industry, then some little sacrifice must be made in order to eke-out our coal supplies. "The gas interests, however, are striving their very hardest to foist the whole of this sacrifice on to the electric generating station. They propose that we should consume fuels discarded by the gas industry, and inferior fuels such as nobody else can employ." We should like to know precisely what is meant by this. The gas industry is not putting the whole of the sacrifice on to the electricity industry. It is itself doing a large part in conserving coal. We have the authority of the Coal Control Department for saying that in twelve months, by way of a start, through making water gas from coke and steaming the charges in its retorts, it produced gas equal to a saving in the consumption of coal of 3¼ million tons; and this work is proceeding to develop as opportunity permits. And what great sacrifice is there in utilizing coke and breeze, as the Nitrogen Products Committee show that it can be utilized, and get a steam-boiler efficiency of 70 to 75 p.ct.—given, of course, a sufficiency of grate area and forced draught? This simply means an adaptation of boiler plant for the purpose. It is not a question of asking the electricity industry to use fuels that nobody else can employ. Some electricity generating stations are already utilizing coke and breeze; and the efficiencies named are obtained from the returns of users. This is evidence of a more valid order than words from the editorial pen of "Meteor." If the electricity industry introduced carbonization and bye-product recovery at an enormous outlay of capital, they would have to use the coke. Then where is the difference? "Meteor" does not seem particularly struck with the carbonization idea. He does not like the look of the ground space to be covered by all the carbonization "paraphernalia," nor the capital charges for the formidable increase in plant per horse power. It might, he opines, be found that the financial burdens could not possibly be shouldered, and that "the destructive burning of coal is in every way preferable from an economic point of view." "Meteor" might find it profitable to re-examine the position, after (for the purpose) he has cleared his mind of his antipathy to the gas industry—if this be possible.

Benzol Visions.

Another view of the pre-carbonization idea is presented by "Electrical Industries." In the matter of producing economy in the industry, it has been subject to interference by people who do not understand the position. It is so easy for those who are interested in motoring, to urge that the electricity industry, who only want fuel for steam-raising, should be compelled to carbonize all the coal now charged under the boilers. There is what "Meteor" would call an "entirely selfish object" in this, presented and persevered in with all disregard to the economic effects upon the electricity industry. "Electrical Industries" refers to the successful efforts that were made by the Motor Legislation Committee to secure amendments in the Electricity (Supply) Act of last session, with the object of encouraging the home production of benzol. As a result, the Electricity Commissioners were given power to "conduct experiments or trials for the improvement of the methods of the utilization of fuel." Further, the Joint Electricity Authorities which may be set up under the Act were empowered to establish plants for the extraction of the valuable bye-products "arising directly or indirectly from the generation of electricity." Had the Motor Legislation Committee had before them something more than platitudes and superficially formed ideas, and had had an opportunity of weighing well the facts presented by the Nitrogen Products Committee, they might not have been so keen over securing the introduction of these permissive powers in the Electricity Supply Act. However, not much mischief has been done; but what the Nitrogen Products Committee have said cannot pass unheeded by the Electricity Commissioners and the Joint Electricity Authorities. There is the Board of Fuel Research, too. They are going to investigate what the idealists propose; and, from our own knowledge of the subject, we have not the slightest doubt that the verdict of the Nitrogen Products Committee will be confirmed by the experimental investigation.

Secrecy and Theatre Heating.

In the "Memoranda" for Jan. 20, there was reference to an article to which the "Electrical Review" gave great prominence, dealing with the heating of the Lyric Theatre, Hammersmith, by electric steam radiators. Statements were made as to these which gave one ground for assuming that the practical results claimed were largely in excess of the limits set by a most generous consideration on a theoretical basis. The "Review" apparently swallowed and adopted more than it could prove. Its article was vague; and there was a secrecy about it which was peculiar in view of the declarations as to heating success and cost economy. A letter by Mr. J. W. Hitchcock in a later issue has brought out useful information, and suggests more. Previously what was said was given on the information of the "purchasers." But now we can get down to concrete facts; and it is hoped that the Editors of the "Review" will apply themselves to the task of proving that the new electrical steam system is as economical and as efficient in heating as a coke-fired boiler heating system, or as a gas-fired one of a modern type. We will call attention to Mr. Hitchcock's letter after referring to the editorial note appended to it. In this it is stated that a coke-fired furnace cannot be started and stopped at pleasure. It can be; but it may have to be started a little earlier than the electric steam radiators. But what matters this, when the relative prices of the fuel are considered? The electric radiators, it is stated, are used for six hours daily; and their efficiency "must in this case be 100 p.ct." Electrical enthusiasts are frequently the victims of a great delusion over this 100 p.ct. efficiency. Why "must" the efficiency be 100 p.ct.? Is nothing whatever lost in the conversion of electrical energy to steam? All told, there are thirty electric steam radiators at the theatre in question; and as they are supposed to require 1 unit per hour each, in the aggregate they use 30,000 watts per hour, which, on the electrical estimate of 1½ watts per cubic foot of air space, would mean that only 20,000 c.ft. of space is heated—this in a place exposed to all sorts of draughts and movements of the air! Given 100 p.ct. efficiency, only 102,600 B.Th.U. per hour would be available. However, the price of electrical energy in Hammersmith is 1·5d. per unit, with discounts, *plus* 25 p.ct. Will the Editors of the "Review" kindly tell us whether this is the price that is paid by the Lyric Theatre, and what the net figure is? We particularly want our contemporary to answer this question. If not, we may be able to get the information elsewhere.

Electricity and Coke Compared.

There are ordinary radiators besides the steam radiators in use at the theatre. The ordinary are probably 2 and 3 KW. per hour ones. Mr. Hitchcock puts down the total consumption of electricity for heating in the theatre at about 40 units per hour, which would mean at 1·5d. per unit, *plus*

25 p.ct., 37s. 6d. for six hours, less discounts. This is a heavy sum for six hours' operation. Mr. Hitchcock gives the electric radiators undue credit; and so in his comparison depreciates the excellent case for coke. He says that he does not suppose that the heat given off per hour by the 37 electric radiators (all included) exceeds 200,000 B.Th.U. It is a physical impossibility for 40 units of electricity to give more than 136,800 B.Th.U.; so that Mr. Hitchcock credits the radiators with 63,200 B.Th.U. more per hour than they can possibly distribute. Nevertheless, let us take (we can afford to be liberal) the 200,000 B.Th.U. He confers on coke a calorific value of only 10,000 B.Th.U. per pound, and adopts a boiler efficiency of 60 p.ct., equal to 6000 B.Th.U. per pound consumed. This means that 33 lbs. of coke would give in useful heat in a heating system 198,000 B.Th.U. per hour, as against 136,800 B.Th.U. with electricity at 100 p.ct. efficiency. If the system is used eight hours per day, the coke consumption would be 264 lbs. If coke was charged at £2 per ton, this would only mean 5s. a day for fuel, as compared with the 37s. 6d. mentioned above for electricity, less the mysterious discounts. The coke-boiler would occasionally require the attention of one of the attendants; and the saving on the electrical energy alone would enable his wages to be supplemented, with a handsome balance to the good. Mr. Hitchcock has a preference for hot-water heating for such places as theatres, and not steam-radiator heating. On the question of maintenance, he says that the cost of the maintenance of the electric radiators will largely depend upon the life of the nickel-chrome wire heating elements, which may or may not require frequent renewal. The maintenance costs of a hot-water heating apparatus, if carefully installed, will be *nil* for several years, with the exception of perhaps a few fire-bars for the boiler. Perhaps our friends of the "Review" will tackle actual costs, consumptions, and temperatures—remembering it is impossible to get out of anything more heat than is put into it.

An "Electrician" Comment.

In our editorial columns on Dec. 23 we commented on the paper that Mr. J. G. Clark had read before the Southern District Junior Gas Association—referring to his statements as to the saving of meat claimed to be effected by cooking electrically, and as to the retention of the nutritious juices in the meat. After a month the "Electrician" has issued the following foolish little comment, which we present to our readers without further remark. "We wonder who first found out that all the 'sapid osmazome' was contained in the second 10 p.ct. loss, rather than in the first. Surely if the osmazome is in the meat and does not evaporate, it makes no difference whether the water loss is 10 or 20 p.ct. Further, we do not admit that by saving a loss of weight in cooking, the ultimate result is a flabby product. We do know that there is no flavour of gaseous products of combustion when electrical methods are employed; also that our wives do not inform us that the dinner is late because the gas pressure has gone down or because the pipes want blowing-out. We wonder what Mr. Pussyfoot will have to say about 'sapid osmazome' soluble in alcohol. The journal in question does not inform us whether the full benefit of the 'sapid osmazome' is best obtained by drinking a whisky and soda with one's dinner. Perhaps our readers will try this experiment for themselves."

COAL STATISTICS FOR 1918.

Annual Report by the Chief Inspector of Mines.

WITHIN the last few days, there has been issued Part III. of the Annual Home Office Report upon Mines and Quarries—Part II. of which was noticed in the "JOURNAL" a fortnight ago. The present part is the one of most general interest—dealing, as it does, with output—but Mr. W. Walker (whose signature it bears) points out that war conditions have again led to considerable curtailment of the report, the omissions including the tables of imports and exports.

In 1918, the total output of coal was 227,748,654 tons, of a value at the mines and quarries of £238,240,760. When compared with 1917, these figures show a decrease in output of 20,750,586 tons, and an increase in value of £30,453,866; the actual totals for that year having been 248,499,240 tons, with a value of £207,786,894. The output in 1916 was 256,375,366 tons, and the value £200,014,626; while in 1915 there was an output of 253,206,081 tons, of a value of £157,830,670. The average price of coal at the pit was 20s. 11·06d. per ton in 1918, compared with 16s. 8·68d. in 1917. The price of coal per ton at the mines in the four preceding years was: 1916, 15s. 7·24d.; 1915, 12s. 5·6d.; 1914, 9s. 11·79d.; 1913, 10s. 1·52d.

To the following extent in the various fields is accounted for the total decrease in output of 20,750,586 tons for 1918 as compared with 1917. In the English fields there was a decrease of 16,766,445 tons, in Wales of 1,624,970 tons, in Scotland of 2,355,526 tons, and in Ireland of 3645 tons. The respective outputs were: England 159,419,825 tons, value at the mines £161,005,514; Wales 36,346,610 tons, value £46,051,974; Scotland 31,890,218 tons, value £31,084,221; and Ireland 92,001 tons, value £99,051. Of anthracite (which is included in the statistics relating to coal) the output for the year dealt with in the report was 3,811,935 tons, having a value of £4,629,402. In 1917 the output of anthracite amounted to 3,799,440 tons, of a value of £3,749,688.

There is given in the report the approximate price per ton of coal at the mines for each county in which it was raised. In the case of England, the price varied from 25s. 0·36d. in Monmouth to 15s. 2·06d. in the North Riding of York; the average figure being 20s. 2·4d. For Wales the figures ranged between 26s. 4·52d. and 23s. 1·59d. in Brecon, and 19s. 11·21d. in Flint; the average being 25s. 4·09d. The highest price for Scotland was 22s. 9·34d. for Dumbarton, and the lowest 17s. 11·88d. in Haddington; with an average of 19s. 5·93d. In the case of Ireland, Antrim heads the list with 36s. 1·17d., while Leitrim is at the other extreme with 13s. 6·09d.; the average being 21s. 6·39d.

Exclusive of coke and manufactured fuel, and of coal shipped for the use of steamers engaged in foreign trade, the quantity of coal exported in the year 1918 was 31,752,904 tons, which compares with 34,995,787 tons in the preceding year, and 38,351,553 tons in 1916. There was also in 1918, in addition to the quantity already named, the equivalent of 1,526,535 tons of coal exported in the form of 915,921 tons of coke, and 1,354,581 tons in the shape of 1,505,090 tons of manufactured fuel; while 8,756,476 tons of coal were shipped for the use of steamers engaged in foreign trade. Thus the total quantity of coal which, in one way or another, left the country was 43,390,496 tons, compared with 48,728,461 tons in 1917, and 55,001,113 tons in 1916. Of the coal exported as such, France received over 16½ million tons, Italy over 4 million tons, and Egypt nearly 1¾ million tons.

Of the total quantity of 227,748,654 tons of coal raised in 1918, the amount remaining for home consumption for all purposes was 184,358,158 tons, or 4·385 tons per head of the population of the United Kingdom, based on the estimated civil population for the year. These figures compare with 199,770,779 tons and 4·725 tons per head of the population for the preceding year. In 1916 the quantity which remained for home consumption (201,374,253 tons) was 4·525 tons per head. Of the total in the year under review, 39,954,974 tons of coal were used in the manufacture of coke and briquettes, as compared with 40,981,757 tons in 1917; while 2,606,840 tons of coal and 11,286,680 tons of coke (together equivalent to 21,417,973 tons of coal) were used in the blast-furnaces for the manufacture of pig iron, against an equivalent of 21,085,875 tons of coal in the preceding year.

During the 46 years from 1873 to 1918, 9,192,072,000 tons of coal have been raised; and of this amount 2,219,868,000 tons, or more than 24 p.ct. of the total production, have been shipped abroad as exports in the form of coal, coke, and manufactured fuel, and as coal used in steamers engaged in foreign trade.

FIGURES RELATING TO COKE.

As usual, the report includes particulars regarding the production of coke and briquettes, and the number of coking-ovens in use during the year 1918. Returns as to the production of coke were received from 131 colliery owners (comprising 172 separate works), 1415 gas companies, and 27 other owners of coke-ovens (comprising 29 works). The counties of Durham and York furnished 64 p.ct. of the total quantity of coke made at coking-ovens. Of the 201 works (other than gas-works) where coking plant is in use, bye-products were in the period under review recovered at 116. The number recovering bye-products—principally sulphate of ammonia and tar—in 1917 was given as 123.

The total quantity of coal used in the manufacture of coke in 1918 is stated to have been 38,219,479 tons; the amount of coke obtained being 21,066,366 tons—7,945,055 tons from gas-works, and 13,121,311 tons from coke-ovens—of a total value of £35,413,547. During the preceding year, there was an output of 21,995,125 tons of coke—8,440,074 tons from gas-works, and 13,555,051 tons from coke-ovens—of a total value of £30,680,447. Of the output from gas-works in 1918, 6,770,708 tons came from England, 165,858 tons from Wales, 806,049 tons from Scotland, 195,059 tons from Ireland, and 7381 tons from the Isle of Man. There were 16,292 coking-ovens in use, as compared with 16,540 in 1917; and of these 6615 were of the bee-hive type, as against 7013 in the previous year. Of the remainder, the types most favoured were: Otto-Hilgenstock, 2236; Simon-Carvès, 1841; Semet-Solvay, 1401; Coppée, 1382; and Koppers, 1369. There were 1,855,689 tons of briquettes produced, selling at the place of manufacture for £2,990,550.

OTHER MATERIALS.

As to iron ore, there was a total output in 1918 from mines in the United Kingdom of 7,565,851 tons, valued at £5,877,725, and from quarries of 7,047,181 tons, valued at £1,228,931. In addition to this, there were 6,581,728 tons of iron ore, valued at £13,441,225, imported into the United Kingdom. With the necessary adjustments, there was a total quantity of ore, &c., available for the furnaces of 21,822,127 tons. From this the quantity of pig iron made was 9,107,384 tons, the value of which would be, according to the average export value for the year, £93,003,961. Of this, 4,581,772 tons, valued at £46,788,732, was pig iron from British ore.

There was in 1918 an output of oil-shale of 3,080,867 tons. The average price per ton at the mines was 9s. 11·08d.; the total value being £1,528,584. The figures for 1917 were 3,117,658 tons, of a value of £1,280,007. The average yield of oil for mines in Scotland is 20 gallons, and of sulphate of ammonia 40 lbs., per ton of shale. In the period covered by the report, 1,324,495,125 gallons of petroleum, valued at £63,933,294, were imported into the United Kingdom. The figures for 1917 were 826,895,171 gallons, of a value of £33,886,972.

AMERICAN GAS-WORKS PRACTICE.*

THE title of this volume by Mr. George Wehrle—"American Gas-Works Practice"—should be borne in mind in reading this review. In writing the book, the author's aim has been to put into concrete form all work appertaining to a gas undertaking in plain and not too technical manner, for the benefit of those employees of a gas undertaking who wish by their own efforts to improve their knowledge, and befit themselves for promotion. Needless to say, in one volume it is impossible to go into much detail when covering all the branches of the work of a gas undertaking from the unloading of coal to the consumers' fittings.

The author commences by giving an account of the history and progress of gas, which is quite an interesting prelude. He then follows on with gases and their properties, manufacturing methods, distribution suggestions, labour-saving in the gas industry, utilization of gas, employees, management, fitting-shop, connecting appliances, house piping, consumers' meters, meter repairs and tests, street department, mains, services and records, acetylene welding, store-room and fitting rules, and gas company rules. To a certain extent the author has attained his aims; but, in our opinion, he has dealt far too superficially with the manufacturing side. As before mentioned, the title is "American Gas-Works Practice;" but out of the whole book, which has 733 pages, he has only devoted 55 to manufacturing methods. Even if the chapters on history and progress, gases and their properties, and labour-saving in the gas industry are included, it only brings the total up to 194 pages out of the 733.

A brief description is given of the construction and working of various types of retort-settings, condensing, exhausting, and purification plant; but the author has not included that small but valuable piece of apparatus, the retort-house governor. Again in dealing with the hydraulic main, no mention is made of the Dillamore tar tower. One statement of the author is that the "off-take pipes dip into the liquid to a depth depending upon the pressure desired upon the retorts, which should be sufficient to prevent the drawing-in of air or furnace gases through the porous retort, but not sufficient to cause excessive waste of gas through cracks or around the joints of the doors. A pressure of from $\frac{1}{4}$ in. to $\frac{1}{2}$ in. of water is usually employed." If the author intends this to mean the pressure inside the retort, surely this can hardly be called modern practice. It is also interesting to note, in dealing with purification, the remark that "the present tendency in purifier designs is towards the open-air tank of cylindrical shape, in which units may be added as required at small comparative costs." A good photograph of this type of purifier is shown. Another point is that it seems to be the accepted practice in America to place a primary condenser or washer-cooler before the exhauster, and a secondary condenser after.

The water-gas and oil-gas plants are fairly well dealt with; and some good photographs are given, two of which show steam-boilers fired by waste heat from the stack-valves. But unfortunately no information is given with regard to the working or results. The author does not favour his readers or students with any description of a sulphate of ammonia plant, benzol-recovery plant, cyanogen recovery plant, or tar dehydration plant.

Distribution work in all its branches is well treated; and practically all the most up-to-date appliances and methods are described. Interesting information and photographs are supplied with regard to the use of acetylene welding for steel mains, and its use in making special steel connections, cutting pipes, &c. The main-laying department of an American gas undertaking is undoubtedly well equipped. The plant used by this department again comes to the fore in the chapter on labour-saving methods—for example, trenching machinery, some ingenious ways of back-filling a trench, compressed-air caulking, and a thawing outfit to avoid digging up frozen ground. Under the heading of management, the author deals fully with this aspect of the distribution side; but, singularly, he does not attempt to lay down any scheme for works management.

A fair amount of space is given to the training and the social welfare of the employees. Without doubt this is a very important point; and, the information supplied suggests that up to the present time, it has received much more attention in America than in England.

The book is well illustrated, and can be thoroughly recommended to any young man who is anxious to better himself in the industry—especially, as our comments have shown, those on the outdoor staff. At the same time, extensive as is the space covered, the work must not be taken as fully comprehensive; and our commendation should be qualified by this.

* "American Gas-Works Practice." By George Wehrle. New York. "Progressive Age" Publishing Company, No. 52, Vanderbilt Avenue.

Cornish Association of Gas Managers.—At the annual meeting of the Association, which took place at Truro on the 21st ult., Mr. H. H. Hoare, of Falmouth, resigned the presidency, which he had held for four years, and Mr. H. E. Riley, of St. Austell, was unanimously chosen to succeed him. Mr. F. G. Kingwell, of Falmouth, was thereupon elected Hon. Secretary, in place of Mr. Riley.

SPONTANEOUS IGNITION TEMPERATURES.

IN a paper which he read at last week's meeting of the Institution of Petroleum Technologists, Mr. Harold Moore, M.Sc. Tech., said that during researches on liquid fuels for internal combustion engines, it became evident that the influence of the temperatures of spontaneous ignition of the various fuels upon their behaviour in such engines was of primary importance. The difficulties experienced in obtaining regular ignition when attempting to burn oils originating from coal tars in Diesel engines, and the high degree of compression possible in engines operating on the constant-volume cycle when running on alcohol or benzol, suggested that some property of the fuels other than those usually determined by analytical examination influenced their behaviour in the engine. As a result, investigations upon the temperature of spontaneous ignition were undertaken. He defined the term "temperature of spontaneous ignition" as the temperature at which a substance surrounded by oxygen or air at the same temperature will burst into flame without the application of a spark or other local high temperature.

It was considered desirable to investigate the ignition points of various mixtures of two fuels; the object being primarily to investigate the relationship between the ignition-point of a mixture and those of its constituents. A series of tests were made; and among the results are the following:

Ignition Points of Mixtures of Benzol (Crystallizable) and Petrol.

Benzol. Per Cent.	Petrol. Per Cent.	Ignition Point. Deg.
100	0	630
90	10	481
80	20	303
70	30	290
60	40	287
50	50	284
40	60	281
30	70	286
20	80	280
10	90	283
0	100	272

Ignition Points of Mixtures of "Cannel Oil" and Creosote.

Creosote. Per Cent.	Cannel Oil. Per Cent.	Ignition Point. Deg.
100	0	468
90	10	455
80	20	316
70	30	316
60	40	314
50	50	311
40	60	304
30	70	303
20	80	302
10	90	302
0	100	302

In view of the fact that it was conceivable that considerable advantage in efficiency might be gained by mixing the commercial fuels used in automobile and aircraft engines, curves were prepared showing the ignition-points of several such mixtures. As it is not practical to vary the compression of car-engines to suit each particular grade of fuel, and as a large portion of the available power is lost when burning fuels of high ignition-point—*e.g.*, benzol and alcohol—in engines designed principally for petrol (a fuel of low ignition-point), it would be advantageous to mix the fuels in such proportions as to yield a standard ignition-point, in order to allow the compression of engines to be raised to such a pressure as would utilize the fuel most economically.

VOLUMETRIC TESTING OF SCIENTIFIC GLASSWARE AT THE NATIONAL PHYSICAL LABORATORY

THE manufacture of volumetric scientific glassware—*i.e.*, burettes, pipettes, &c.—is an industry which was practically non-existent in this country before the war. During the war the industry was largely developed; and it is most desirable that it should remain as a permanent British asset. To attain this, a supremely important factor is that British made graduated apparatus should be of reliable accuracy. In establishing a reputation for accuracy, the British manufacturers realized the advantage of having their apparatus guaranteed by an impartial institution; and all users of such apparatus should know that it is now possible to obtain apparatus whose accuracy has been so verified.

Volumetric glassware has been tested on a small scale at the National Physical Laboratory for the past fifteen years. With the growth of the industry in this country, it was felt that the scope of the work should be widened. Consequently, in co-operation with manufacturers and users of scientific glassware, a pamphlet was issued in July, 1918, containing regulations relating to Class "A" tests—*i.e.*, tests on apparatus required to be of the highest accuracy. A new building has just been completed at the Laboratory specially equipped for dealing with this class of work on a large scale.

At the outset, it was urged that, in addition to the tests already referred to, provision should be made for testing apparatus intended to possess commercial or Class "B" accuracy. Pending the settlement of a permanent scheme for commercial testing

by the State, or State-approved institutions—a matter which is at present under consideration by the Government—the National Physical Laboratory is now prepared to undertake Class "B" tests at the request of manufacturers and others; such tests being carried out for the time being at Teddington. It is hoped eventually to arrange for this work to be done at local centres.

The Class "A" tests are designed for vessels intended to possess the highest accuracy required for scientific use; but the limits of error assigned for the Class "B" tests are such as all graduated apparatus of good commercial quality should comply with, and are necessary for the attainment of satisfactory results in ordinary routine analysis. A full account of the tolerances allowed, methods of tests, details of construction, test fees, &c., is given in the new edition of the Laboratory test pamphlet relating to "Volumetric Tests on Scientific Glassware," published in November, 1919. Copies of this pamphlet, which was drawn up in co-operation with both manufacturers and users of volumetric apparatus, may be obtained free of charge on application to the Director of the National Physical Laboratory, Teddington, Middlesex.

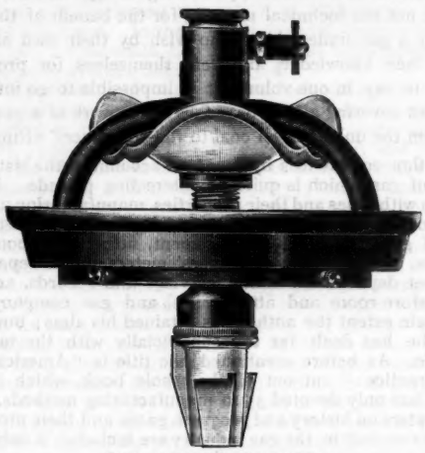
The attention of users of scientific glassware is particularly directed to the provision made for testing this apparatus, as it is felt that the existing facilities for obtaining standardized volumetric apparatus are not sufficiently widely known. In the event of users of apparatus requiring tests other than those provided for in the pamphlet, the Laboratary is always prepared to make special arrangements to meet the particular requirements of any special work. By making full use of the facilities offered for testing volumetric glassware, users will ensure that they have reliable apparatus without having to make special arrangements to check their own deliveries, and, moreover, will indirectly tend to maintain a high standard of production throughout the whole industry.

THE PODMORE "IVEX" DUST-PROOF BUNSEN BURNER.

One Burner for any Quality of Gas or Size of Mantle.

OUR manufacturers are now busying themselves in preparing productions to meet the new conditions which are entering upon their reign in the gas industry. The changes in the quality of gas is the principal consideration; and under the heat-unit legislation that is coming, as a result of the Beilby report, appliances will require to be of a character which will meet a large range of variations in gas quality, so that the cost of production can be kept within reason by standardization. We have been shown the "Ivex" burner which Messrs. Podmore & Co., of Charles Street, Hatton Garden, W.C., have devised, and which can be used anywhere and by anybody under any conditions of gas supply; the same burner being employed for any mantle from a bijou up to a universal standard size. A burner with such a range of adaptability will not fail to attract attention and custom, as it meets what is required in relation to the gas supply, the quantity of light for any situation, and yet only the one type and size of burner. All that has to be done is to use the nozzle best adapted to the gas supply and the size of mantle required; the burner is fitted to do the rest. Even the globes for the different sizes of mantles are the same. Therefore all the stock required is the one burner, and a supply of nozzles for the different size mantles. A burner of the kind should be especially valuable in housing schemes; and more particularly because it is strong. But, of course, it is equally applicable to all situations—whether dwelling-houses, shops, offices, or factories.

The original Podmore intensive lamp burner, with the air supply drawn through tubes (during the travel through which it became heated), will be remembered. The burner has been remodelled; and the new "Ivex" burner is designed on the same principles. The air port-holes are below the line of the outlets of the products of combustion. There are three of these inlets on the underside of the corona or globe support; and the air is carried up by seamless tubes (being heated on the way by the products of combustion) to the mixing chamber, which is drawn from rodding metal. The downward tube of the burner is also seamless. The brass nosepiece into which the mantle holder is screwed is likewise drawn from solid rodding; so that there are no seams in the tubes that can get split, or contribute to the perishing of the burner. The corona is pressed out of the piece by power. The screws to support the globes are made from solid rod, and have good head pieces to operate them, which is a change from the old flat headed arrangement, which it was at times very difficult to get hold of.

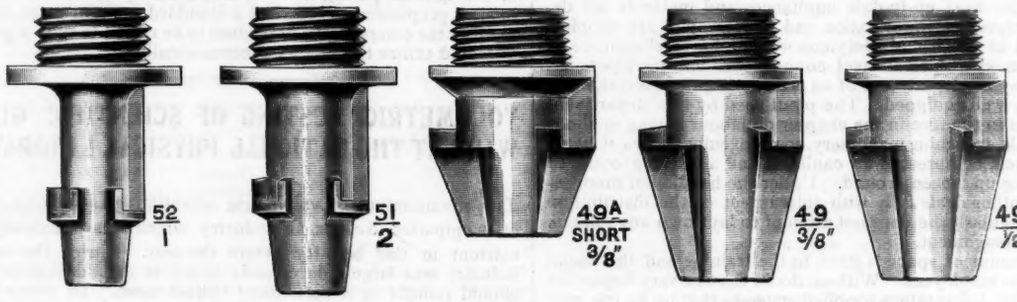


THE "IVEX" BURNER.

These details attest strength, and give confidence as to long service. The three air port-holes are provided with shutters; so that the air supply can be adjusted over a considerable range of requirement. A regulator is attached to the burner for the adjustment of the gas supply. Where gas is supplied definite in calorific power, specific gravity, and pressure, a suitable nipple can be fitted, and the adjustment device be then dispensed with. The details show that every point has been considered to meet present-day requirements—more particularly of the lower grades of gas.

While on these structural points, it might be mentioned that a gauze is inserted in the nozzles; but this is not necessary where a high quality gas is being supplied. It will, however, be the firm's custom to fit all new nozzles with gauzes; and the gauzes are of suitable size for any nozzle. In the case of high pressures, a gauze is also put into the mixing chamber. The standard burner is finished in oxidized copper.

The interchangeable nozzles are perhaps the most interesting feature. Gas undertakings using the burners will, of course, procure a series of the nozzles for testing their gas, to ascertain which are the most suitable; and then, when ordering burners, quote the numbers of the nozzles required for the different sized mantles. Under the accompanying illustration of the nozzles, the mantles are mentioned for which they are designed. Attention may be directed to three points. It will be noticed that No. 49A nozzle is for a short universal mantle; No. 49 nozzle with the ⅜-in. bore is serviceable for high-grade gas; No. 49 has a ½-in. bore for low-grade gas. It will be seen, too, that all the nozzles are made with a rib, which prevents the accident of over-running the seats for the mantle support when putting on new mantles.



Bijou Mantle. | No. 2 or Medium Mantle. | Universal Ring Short Mantle. | For High-Grade Gas. | For Low-Grade Gas.

Universal Standard-Depth Mantle.

We have seen one burner in use (the gas being of about 475 B.Th.U.) with the bijou nozzle and mantle, and with the nozzle for the universal standard mantle—the two extremes; and with both mantles adjusted to give maximum duty, no one could wish for better result. If one did, it would be unreasonableness that dictated it. The "Ivex" burner, in our opinion, will justify its claim to being suitable for any gas or any size of mantle.

Temporary Increase of Charges Act.—The Ministry of Health have made an Order authorizing the Bala Urban District Council to increase the maximum price charged for gas from 5s. 6d. to 6s. 8d. per 1000 c.ft., subject to the domestic rebate consequent upon the reduction of 10s. per ton. in the price of coal.

W-D

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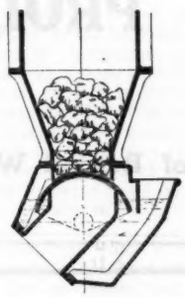
— INERTS. —



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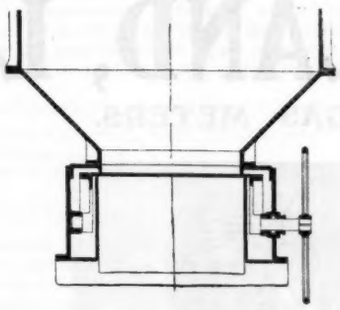

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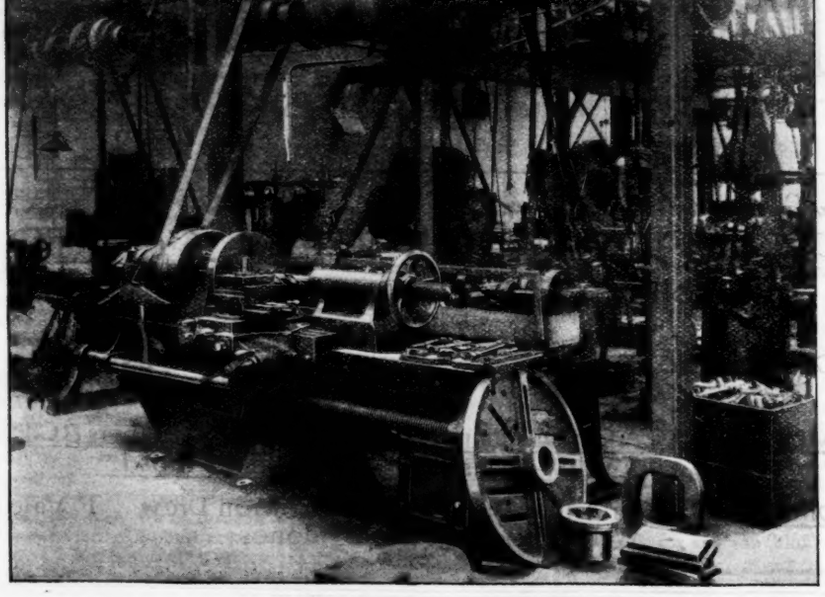


TOOL ROOM.

WARWICK ROAD, GREET, BIRMINGHAM

COAL GAS IN INDUSTRY.

By Dr. HAROLD HARTLEY, Chief Chemist to the Richmond Gas Stove and Meter Company, Ltd.

[Abstract of a Lecture to the London and Southern District Junior Gas Association, Jan. 30.]

The lecturer began by saying it was not his intention to recite and illustrate a number of the multitudinous uses to which town gas is put, but rather to consider one or two types of process and discuss their efficiency.

ADVANTAGES AND DISADVANTAGES OF TOWN GAS.

The fuel possesses certain advantages, among which may be stated:

(1) Ease of manipulation.
(2) High calorific intensity.

Town gas has, however, one very marked disadvantage compared with other fuels of high calorific intensity—namely, its high cost when measured in terms of B.Th.U. At the outset, I wish to emphasize this disadvantage, as, though it is not the only one unfortunately that can be cited against the town's supply of recent years, it is one that cannot be eliminated entirely by legislation.

The proposal which it is hoped will become law in the near future, to charge the consumer on the basis of the calorific value of the gas supplied, will do much to restore the confidence of the manufacturer. It seems to me, however, a matter for regret that the gross calorific value of the gas should be employed, whereas the practice is now common to base all computations on the net calorific value. This is done because the latent heat of condensation of steam can so rarely be taken advantage of in heating processes.

While the proposals in the amended report of the Fuel Research Committee of the Board of Trade condone the use of the gross calorific value as a basis of calculation, they offer much scope to the gas manufacturer, advantage of which, I hope, can be taken to enable a saving to be effected in the cost, in terms of British thermal units, of applying the fuel while still retaining the high calorific intensity which is so useful in connection with high-temperature work. If this can be done, then the public utility of the gas industry will be increased. I think it is not generally realized what a large volume of business could be obtained at the present time if the cost of gas (in terms of B.Th.U.) were reduced materially.

Oil is a lusty competitor of coal, than which it is dearer in terms of B.Th.U. purchased per penny. At the same time, it must not be forgotten that it is a fuel possessing the majority of the advantages of coal gas, and at its present price is equivalent to a 500 B.Th.U. gas at 4s. per 1000 c.ft. The number of cases where formerly gas-furnaces would have been wanted in which oil-furnaces are asked for is rapidly growing, as manufacturers are beginning to realize the possibilities of liquid fuel; and yet the large oil companies are only starting to move after the removal of the control.

The applications of gas can be divided into two main types:

(1) Low-temperature work—*e.g.*, water heating, steam raising, cooking, japanning, &c.
(2) High-temperature work—*e.g.*, metal melting and general heat treatment.

THE INDUSTRIAL CANTEEN.

The industrial canteen, which has been so largely developed in recent years, should provide the gas engineer with a very useful day load. The canteen is regarded by the progressive manufacturer as a sound business proposition; and there are now so many of them throughout the country which employ town gas as fuel, that little difficulty should be experienced in persuading a potential customer as to their merits. A summary from a profit and loss account supplied me by our Special Apparatus Department, for a canteen in the North fitted out for 500 persons, shows that the fuel bill represents less than 5 p.ct. of the turnover. At the same time the application is one in which the ease of operation with gaseous fuel by far outweighs any extra cost which might be incurred by its substitution for coal. Further, it is such a simple matter to check the fuel consumption at frequent intervals, to work out the cost of any particular dish, and in general to arrive at the details that are so essential to enable a department to be run at a nominal profit.

The various operations in the preparation of the food come within the range which I have termed "low-temperature work." For this class of work, high calorific intensity is not essential; and little difficulty would be experienced, were it so desired, in fitting-out a canteen to run on ordinary producer gas.

The gas appliance maker has hitherto sacrificed thermal efficiency in certain portions at least of canteen equipment, in order to ensure robustness and to facilitate working. In this connection, I have in mind more especially the hotplates of large gas-ranges; and I think you will find in the near future that considerable improvement will be available in this direction. Perhaps the appliances with the highest thermal efficiency in use in canteens are those employed for water heating.

Fig. 3 (p. 249) indicates that the percentage of heat available for these low-temperature operations is high—*e.g.*, for a process in which the temperature of the products can be reduced to say 200° C., there should be available 92 p.ct. of the net thermal energy of the gas; and even with producer gas, 90 p.ct. of the thermal energy would be available. It is thus to be anticipated that high thermal efficiencies will be realized for these low-temperature processes, even with apparatus of simple design. Thus an ordinary ring boiling-burner, used in conjunction with a tinned iron kettle for heating water to boiling-point, is capable of showing a thermal efficiency of 65 p.ct. (net calorific value), when due allowance is made for the steam evolved and the heat capacity of the vessel.

THE HOUSING PROBLEM.

The next application with which I wish to deal concerns the housing problem. On this I propose to touch but briefly, as it may not be regarded as falling within the scope of the present lecture.

Some five years ago we indicated that it was possible to obtain a cooker hotplate which would show a thermal efficiency of well over 50 p.ct. (net calorific value), when used for water heating; and though this cooker was very much in advance of any other obtainable at the time, the experience which we have gained in its design, as well as the outcome of further work resulting in another big step forward, will be available in various designs of cookers in the near future.

Grilling was the least efficient operation; and this we have been able to improve greatly. Of the gas used in a domestic cooker, by far the greater portion is employed on the hotplate. In the case of the oven, the thermal efficiency is limited by prime cost; but, as you are aware, even the existing cooker oven has more than justified itself.

While it probably costs a little more to cook by gas than with the coal-range, nevertheless the fact that the gas-cooker can be put into operation at very short notice is an advantage which appeals to all gas consumers; and, as already mentioned, in connection with canteen equipment, the gas bill is a relatively small item.

The water-heating question in some respects proved the most troublesome. The appliances proposed have generally been either of the instantaneous type—*e.g.*, the geyser—which burnt a large amount of gas for a short time, and often necessitated the employment of a larger meter and large piping in the house, or the circulator, which used gas at a lower rate, but for a longer period. Of the two systems, the latter is the more expensive to run, and should not be recommended where the fuel cost has to be considered carefully.

To meet the case just mentioned, Richmond's Water Heating Department have designed a simple heater which can be used to give (*a*) a small volume of water at relatively short notice or (*b*) a volume large enough for a 5 ft. 6 in. bath at somewhat longer notice.

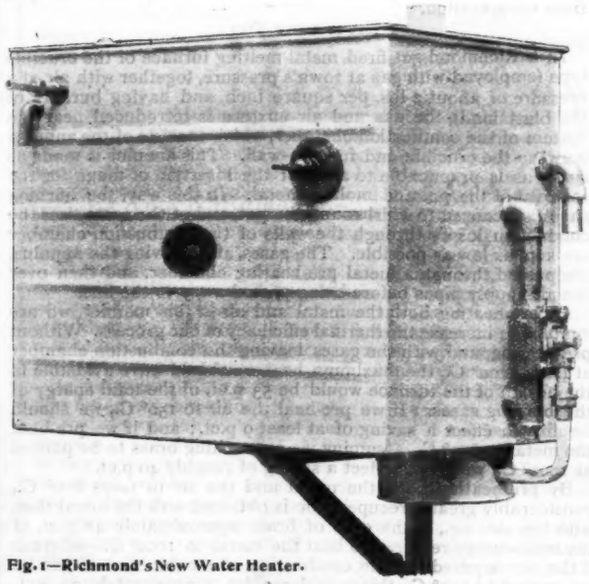


Fig. 1—Richmond's New Water Heater.

This appliance (fig. 1) has the obvious advantage over the circulator that gas is not burnt in maintaining a long length of water-pipe hot. At the same time, the heater can replace the ordinary builder's set, and supply hot water at various points of the house if desired. In this case, the heater is inserted at the top of the hot-water system, in contradistinction to the practice with the circulator.

There are given below test data concerning the "Don" geyser, the "Ironclad" circulator, and the Richmond self-contained water-heater.

"DON" GEYSER.

Gas consumption	64·8 c.ft. per hour net.
Calorific value	169 K.C.U. c.ft. gross.
Water flow	825 lbs. per hour.
Efficiency	84·1 p.ct. gross.
	93·3 p.ct. net.
Temperature rise	44° Fahr.

"DON" GEYSER, BURNING 74 C.FT. PER HOUR.

Efficiency	88·2 p.ct. gross.
	97·0 p.ct. net.
Water flow	1154 lbs. per hour.
Temperature rise	38° Fahr.

SELF-CONTAINED HEATER.

Intercommunication Valve Closed.

Initial temperature	45° Fahr.
Gas burnt	8·86 c.ft. net.
Time taken	20½ minutes.
Water run off	35 lbs.
Temperature of bulk	115° Fahr.
Efficiency	59 p.ct. (gross C.V.)
Obtained as hot water (*i.e.*, domestic efficiency)	66 p.ct. (net C.V.)

Intercommunication Valve Open.

Temperature	50° Fahr.
Gas burnt	35·8 c.ft.
Time taken	80 minutes.
Water run off	200 lbs.
Temperature in bulk	99° Fahr.
Domestic efficiency	57·3 p.ct. (gross C.V.)
	64·0 p.ct. (net C.V.)

"IRONCLAD" CIRCULATOR.

Test.—Rise in water temperature, 40° Fahr. Gas consumption, 45 c.ft. per hour.

Length of Flue Piping.	Efficiency. Gross C.V. P.Ct.	Net C.V. P.C.
0	72·5	80·0
	72·7	80·2
2 ft.	73·7	81·0
	73·3	80·8
4 ft.	74·0	81·5
	73·7	81·0
6 ft.	73·7	81·0
	74·7	82·0

A domestic test with water run into a bath at an average temperature of 100° Fahr. was equivalent to a

Domestic efficiency =	66·5 p.ct. gross C.V.
(Average of five tests)	73·0 p.ct. net C.V.

HIGH-TEMPERATURE USES.

The lecturer then proceeded to give some general details of furnaces operating on town gas—illustrating and describing a regenerator oven-furnace, Richmond's "L.P.G.A." (low-pressure gas and air) furnace, Richmond's gas and air blast (pit type) crucible furnace; and he afterwards discussed the maximum efficiency obtainable in various processes and the advantages to be derived from recuperation.

EFFICIENCY DATA.

In a Richmond gas-fired metal-melting furnace of the crucible type (employed with gas at town's pressure, together with air at a pressure of about 2 lbs. per square inch, and having burners of the blast kind), the gas and air mixture is introduced near the bottom of the combustion chamber, which consists of the annulus between the crucible and furnace-wall. This annulus is made as small as is practicable to allow of the insertion of tongs for the removal of the pot and molten metal. In this way, the burning gases are caused to whirl round the pot, and at the same time the conduction losses through the walls of the combustion chamber are kept as low as possible. The gases, after leaving the annulus, are passed through a metal pre-heating chamber, and then over the air-supply pipes before being passed away to the flue.

By pre-heating both the metal and air in this manner, we are enabled to increase the thermal efficiency of our process. Without pre-heating, and with the gases leaving the combustion chamber at (say) 1100° C., the maximum heat we should have available in the hearth of the furnace would be 53 p.ct. of the total energy of the burning gases. If we pre-heat the air to 150° C., we should be able to effect a saving of at least 9 p.ct.; and if we pre-heat the metal to 600° C., assuming we are melting brass to be poured at 1000° C., we should effect a saving of roughly 40 p.ct.

By pre-heating both the metal and the air to (say) 600° C., considerably greater recuperation is obtained with the metal than with the air—*e.g.*, in the case of brass approximately 40 p.ct. of the total energy required to heat the metal to 1000° C.—whereas if the air required for the combustion of 1 cubic foot of gas be pre-heated to 600° C., this would require approximately 20 p.ct. of the total thermal energy of the gas.

Pre-heating of the air, however, introduces another advantage, in that the temperature attained on combustion is increased, and thereby the energy available in the hearth is raised considerably. This is well illustrated by the following table, which refers to the amount of air required for the complete combustion of a coal gas used in some calculations which are given later.

In Column 1 we have the temperature to which the air is pre-heated, in Column 2 the percentage of the net potential energy of the coal gas contained in the pre-heated air, and in Column 3 the percentage increase in the heat available in the furnace-hearth for a process in which the products of combustion leave at 1100° C.

Column 1.	Column 2.	Column 3.
100° C.	3·1 p.ct.	6 p.ct.
300° C.	9·5 p.ct.	18 p.ct.
600° C.	19·4 p.ct.	37 p.ct.

In actual practice, we have obtained during the melting of brass in this furnace the following results with the metal poured at about 1000° C.

Number of melts made consecutively.	4	6
	Gas Consumption C.Ft. per Pound of Metal Melted.	
No pre-heating (*a*)	3·10	2·91
Brass pre-heated (*b*)	2·72	2·48
Brass and air pre-heated (*c*)	2·42	2·17

The actual consumptions for the fourth melts were:

(*a*) 2·52 c.ft. per lb.
(*b*) 1·99 " "
(*c*) 1·66 " "

The gas used in the experiments was approximately 550 B.Th.U. per cubic foot net.

It is of interest to note, further, that careful determinations of the temperature of the air at the point of admission to the burner showed that during the above test this did not exceed 120° C.

We see from the curves given in fig. 4 that such pre-heating should not increase the heat available in the furnace-hearth by more than 7·5 p.ct. As the calculations involved in these curves are all based on the assumption that the theoretically possible flame temperature is attained, this may explain the apparently excessive saving brought about by air pre-heating, as it is highly doubtful whether such temperatures are even approached.

Furnace designers would appear to have forgotten, in many cases, this very important effect of air pre-heating on the temperature attained in the combustion chamber. This becomes of increasing importance as the temperature of the process to be carried out increases. In actual practice there is evidence, as in the case just cited, that the saving effected by the degree of pre-heat would probably be much in excess of that to be anticipated from these curves.

The actual thermal efficiencies for the fourth melts given above are approximately 20, 25, and 30 p.ct.; and if it be assumed that the products leave the melting-chamber at 1100° C., the hearth efficiency as represented by test (*a*) is roughly 38½ p.ct.; test (*b*) is equivalent to a hearth efficiency of 48 p.ct.; and test (*c*), to a hearth efficiency of 57·5 p.ct. Further, from the above data it will be seen that, under the steady state conditions as represented by the fourth melt, the gas consumption had been reduced:

(*a*) 21 p.ct. by pre-heating the metal to approximately 600° C.
(*b*) 34 p.ct. by pre-heating the metal to approximately 600° C. and the air to 120° C.

From these results, it may be deduced that roughly three-quarters of the total energy was required to raise the temperature of the mass from 600° to 1000° C.; whereas only about 60 p.ct. of the total energy transmitted to the metal is necessary for this elevation of temperature.

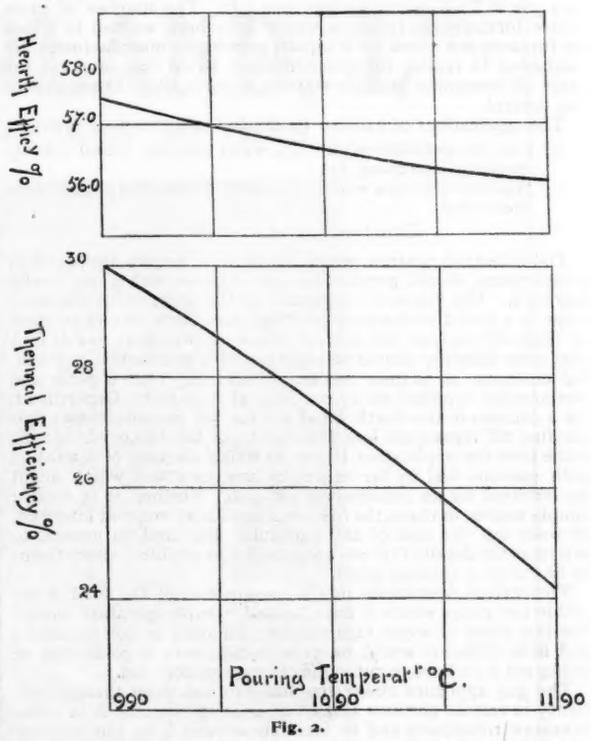


Fig. 2.

The thermal efficiency for the melt (*a*) is approximately 20 p.ct. whence it follows that roughly the thermal efficiency of the stage 600° — 1000° = 16 p.ct.; 0 — 600° C. = 32 p.ct. The rapid drop in thermal efficiency as the end temperature is raised is further evidenced by the curve in fig. 2, which I have plotted from results obtained with this furnace in the melting of various metals of roughly the same specific gravity. This serves to show that the thermal efficiency of a metal-melting process using gaseous fuels

falls off sharply as the pouring temperature rises. If, as before, we assume that the products of combustion must leave the hearth at a temperature of 100° C. above the pouring temperature of the metal, we see the effective hearth efficiency falls less rapidly.

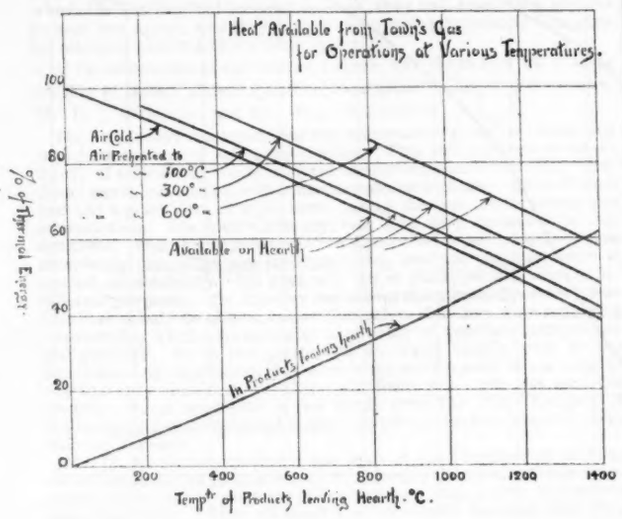

Heat Available from Town's Gas for Operations at Various Temperatures.
Air Cold
Air Preheated to 100°C
" " 300° "
" " 600° "
Available on Hearth
In Products leaving Hearth
% of Thermal Energy.
Tempᵗᵉ of Products leaving Hearth - °C.

Fig. 3.

The curves given in fig. 3 show the percentage of the thermal energy available in the gas which is contained in the products of combustion at various temperatures. In any furnace operation the gases must leave the hearth or working chamber at least as hot as the work itself. Thus there is available, theoretically, in the furnace-hearth such energy as can be abstracted from the products on cooling from the temperature of combustion to the temperature at which they leave the hearth.

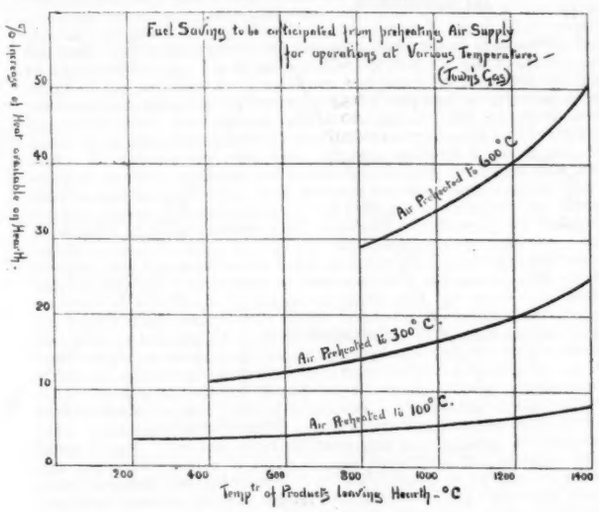

Fuel Saving to be anticipated from preheating Air Supply for operations at Various Temperatures — (Town's Gas)
Air Preheated to 600° C.
Air Preheated to 300° C.
Air Preheated to 100° C.
% Increase of Heat available on Hearth.
Tempᵗᵉ of Products leaving Hearth - °C

Fig. 4.

To simplify calculation, I have used the town gas employed by a former member of the Research Department Staff, Mr. F. W. Epworth, in his "Hadfield Essay;" and the percentage of heat in the products given in fig. 3 is plotted from Table 16 of that essay. The curves in fig. 4 are re-drawn from the data of fig. 3, in order to emphasize the possible savings which might accrue from pre-heating the air supply. The bottom curve indicates that little saving is to be anticipated by air pre-heating from low-temperature operations. In fact, in such cases the main loss of energy is due to conduction through the walls of the appliance.

Oven-Furnace Testing.

The testing of oven furnaces offers some difficulties; and the relative advantage of one type of furnace over another will probably depend to some extent on the use to which it is to be put. In recuperative furnaces a considerable period of operation is required at the maximum working temperature before the maximum air pre-heating is obtained; and the use to which the furnaces are put may not involve a process sufficiently prolonged to allow full recuperation to be attained.

Maintenance Tests.

In the case of the "L.P.G.A." furnace, maintenance tests were carried out for a period of ten hours each day on successive days; the furnace being turned out over night with all dampers closed to lessen the cooling. It was not until the third day that the maximum recuperation was attained, when, with a temperature of 1000° C. in the oven, pyrometers placed in the air-pipes near the point of combustion, recorded a temperature of 350° C. The consumption was 260 c.ft. per hour of a gas of 114 K.C.U. per c.ft. net calorific value. A temperature of 1000° C. was maintained in the regenerator furnace on a gas consumption of 330 c.ft. per hour of 118 K.C.U. per c.ft. net. The energy supplied in the first case was equivalent to 29,650 K.C.U. per hour, and in the second case to 38,940 K.C.U. per hour. As the cubical capacity of the two furnaces was the same, the "L.P.G.A." showed a saving of roughly 25 p.ct. on the regenerator furnace.

Annealing Tests.

The next curve [shown on the screen] was for the heating-up of a load of steel in the two furnaces, starting from cold in each case. The load was 450 lbs.; and with the "L.P.G.A." furnace the gas consumption was 1890 c.ft.—2360 c.ft. being the consumption in the case of the regenerator furnace. In each case the gas consumption given has been corrected for variation in calorific value. These consumptions are equivalent to 4·20 c.ft. per lb. in the former case, and 5·25 c.ft. per lb. in the latter case. The "L.P.G.A." furnace shows a saving of 20 p.ct. in this case. It is also of interest to know that the temperature of the pre-heated air was not found to exceed 150° C.; so that assuming the products left the oven at 1000° C., pre-heating would not have been expected to effect a saving of more than 8 p.ct. according to fig. 2.

The test was carried out with the limitation that the load was to be heated up to 820° C. without the temperature on top exceeding 900° C.; the atmosphere also to be maintained sufficiently reducing to prevent any scaling of the metal. The heating-up curves show that the under-fired furnace lags behind, especially in the earlier stages of the heating processes, but makes up some of the lee-way during the later stages of the treatment.

Walter's Test.

Fig. 5 represents the application of a test, suggested by Dr. C. M. Walter, to these two furnaces.

The test is divided into three distinct stages. The first stage consists in heating-up the empty furnace to 900° C. As soon as this temperature is attained, the load of metal is inserted and the heating continued (stage 2) until the centre of the load attains a temperature of 820° C. (the temperature at the top of the load not to exceed 900° C.). As soon as the load has been heated to the required temperature, the gas consumption is reduced to maintain the work at this temperature for a period of an hour (stage 3). In the test recorded, the maintenance stage of the "L.P.G.A." furnace was extended to about two hours, the consumption being kept unaltered during this period; in fact, each stage was characterized by a definite gas consumption. The following results were obtained:

	"L.P.G.A."	*"Regenerator."*
Stage 1 . .	1120 c.ft. = 2·49 c.ft. per lb.	1180 c.ft. = 2·63 c.ft. per lb.
Stage 2 . .	980 " = 2·18 " "	2080 " = 4·63 " "
	4·67 c.ft. per lb.	7·26 c.ft. per lb.

By working at a higher gas consumption during stage 1 with the "L.P.G.A.," the gas used during the stage could have been reduced; but I have found in making several of these tests that, within limits, the total gas required for stages 1 and 2 remains constant, and that what may be saved in stage 1 in the manner indicated is lost during stage 2. For stages 1 and 2 in the above test, the "L.P.G.A." shows a saving of roughly 33 p.ct. over the "Regenerator."

The great difficulty in carrying out comparative tests of this sort with oven furnaces consists in maintaining comparable atmospheric conditions in each furnace; and I incline to the view that the relatively increased consumption recorded in the test above with the regenerator furnace may have been due to the atmospheric conditions maintained in the furnace.

In carrying out the test of the "L.P.G.A." furnace, advantage was taken of the method of burning the gas to produce a deposit of soot on the top of the work as soon as it was inserted in the furnace. The formation of this carbon deposit probably allows of more complete combustion of the gases during the heating of the metal, without any scaling of the latter, than is possible when such a deposit cannot be produced.

Towards the completion of the second stage, as the temperature of the top of the load reached 900° C., the air supply was reduced slightly. This had the effect of stopping the rise of temperature of the upper portion of the load, without apparently interfering with the rate of heating-up of the centre of the load, sufficiently to allow of the completion of the test without exceeding 900° C. in any part of the metal.

Towards the end of the maintenance period, the temperature of the furnace rose appreciably, due to an increase in the calorific value of the gas supply. This effect indicates the desirability of supplying gas of constant calorific value.

The figures for the gas consumption obtained in the above tests are considerably higher than the results generally obtained in working practice, due to the fact that the furnace was small and not fully loaded. In "L.P.G.A." furnaces of from 2 to 4 tons capacity, it is common practice to anneal steel at a gas consumption of from 1·5 to 2 c.ft. per pound.

Gas Composition.

Finally, there are one or two points in connection with gas composition to which I would draw your attention.

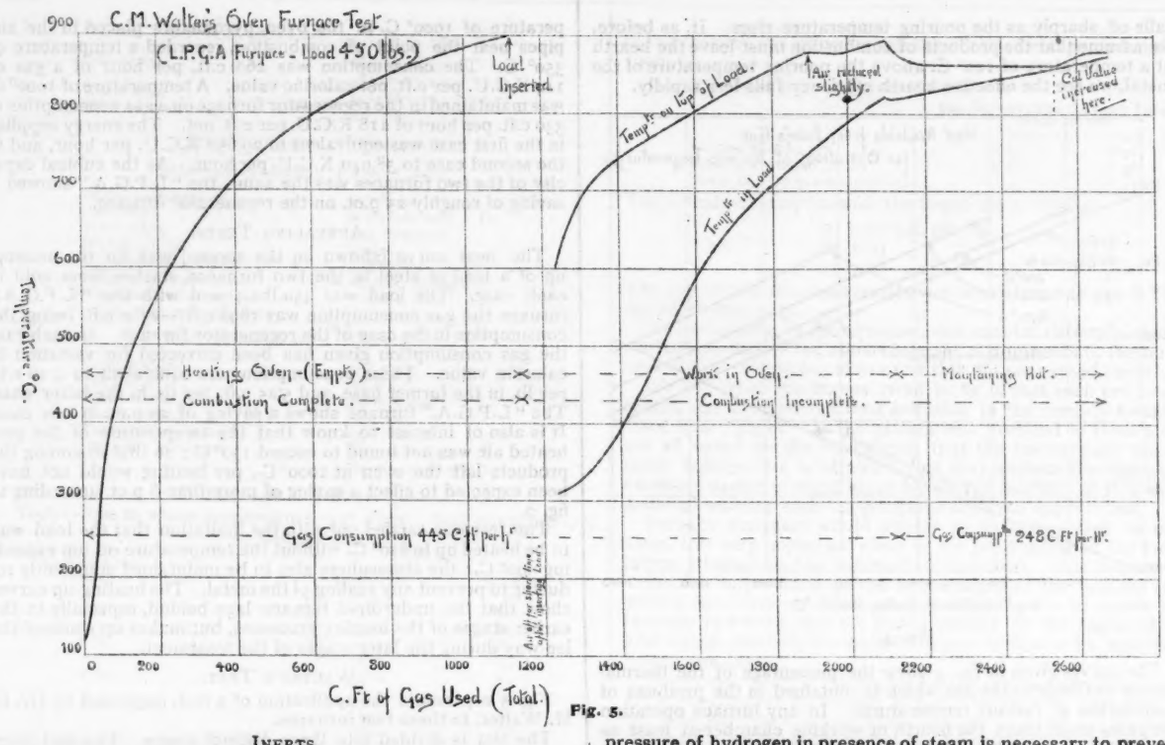


Fig. 5.

INERTS.

Theoretically, it is to be expected that in the case of the coal gas just considered, dilution with nitrogen so that the mixture contains an additional 25 p.ct. of the inert gas will decrease the efficiency by 10 p.ct. with products leaving at 1400° C. (*vide* fig. 6). That is, whereas in the case of the original gas there should be available in the hearth 38 p.ct. of the total energy, the

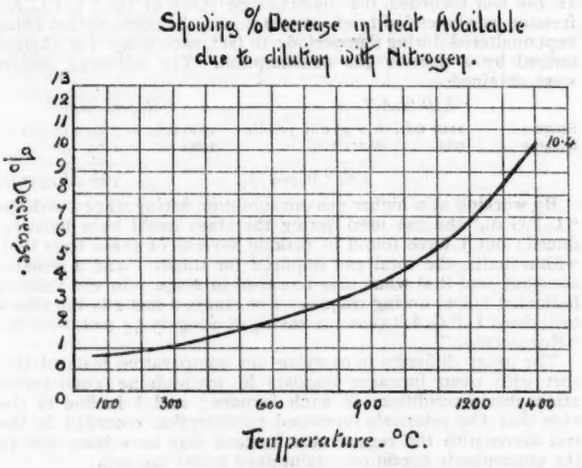


Fig. 6.

diluted gas would yield only 34 p.ct., and the gas used for the process would be increased by at least 10 p.ct. Failure to attain theoretical flame-temperatures would increase this loss; while, on the other hand, pre-heating of the air would decrease the percentage loss.

Suppose such an inert diluted gas was used without any pre-heating for a process, and that the maximum temperature attained by the burning gases was 1700° C., if the products left at 1200° C., then the consumption would be increased by almost 10 p.ct., due to the inert dilution.

CHEMICAL COMPOSITION OF THE GAS.

In dealing with the testing of oven furnaces, mention was made of the necessity of maintaining a state of incomplete combustion in the oven-chamber, so as to avoid scaling in steam annealing.

In view of this necessity and the present-day importance of this question, I would draw your attention to the partial pressure curves (fig. 7) relating to the equilibrium conditions for

(*a*) $CO_2 + Fe \rightleftarrows FeO + CO$*

(*b*) $H_2O + Fe \rightleftarrows FeO + H_2$

From these it will be seen that below 1000° C. a greater partial pressure of hydrogen in presence of steam is necessary to prevent oxidation of the iron than of carbon monoxide in the presence of carbon dioxide; and at 1000° C. the ratio $\frac{CO_2}{CO} = \frac{8}{17}$ and $\frac{H_2O}{H} = \frac{1}{2}$ for equilibrium.

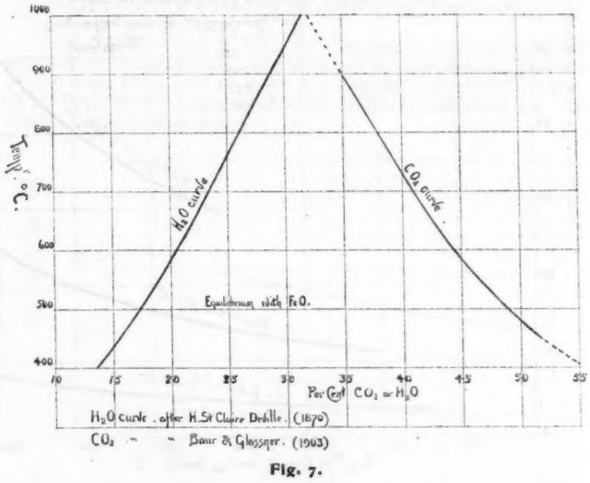

Temp. °C.
H₂O curve
CO₂ curve
Equilibrium with FeO.
Per Cent CO₂ or H₂O
H₂O curve - after H. St Claire Deville. (1870)
CO₂ - - Baur & Glässner. (1903)

Fig. 7.

It is to be expected that it will be more difficult to prevent oxidation when water gas is used as a fuel than with a gas containing hydrocarbons which by partial combustion can be converted into CO, H_2, and H_2O, with liberation of energy which will assist to maintain the required working temperature—*e.g.*, $CH_4 + O_2 = CO + H_2 + H_2O + 74{\cdot}6$ K.C.U.; so that, roughly speaking, 1 c.ft. of methane burnt in this way would liberate 380 B.Th.U. Further, in such an industrial mixture of CH_4, H_2, and CO as coal gas, it is to be expected that, with a deficiency of oxygen, the gases will be oxidized in the order given. However, in view of the extent to which coal gas is used for open annealing of steel, the effect of the composition on the tendency to scale production or to the more readily produced decarburization is worthy of examination.

The Fuel Research Committee of the British Association, in their second report, among other proposals suggest that town gas shall contain not less than 20 p.ct. of CH_4, "owing to the relatively narrow range of explosibility of its mixtures with air and the low speeds with which flame is propagated through them."

In this connection, the following results for the maximum speed of uniform movement of flame in mixtures of CH_4, H_2, and CO published by W. Payman ("Journal of the Chemical Society," 1919, p. 1454) are of interest:

$CO + H_2$	315·0 cms. per second
$CH_4 + H_2$	135·3 " " "
$CH_4 + CO$	91·3 " " "
$CH_4 + H_2 + CO$	150·0 " " "
Coal gas	154·1 " " "

* This curve is drawn from the one given by M'Cance (Iron and Steel Institute, May, 1919): the broken line representing extrapolation from the original.

DISCUSSION.

The PRESIDENT (Mr. S. B. Chandler, of the South Suburban Gas Company), in introducing the lecturer to the large audience that had assembled to hear him, said, remembering the previous occasion on which Dr. Hartley had lectured to them, they had been very anxious to hear him again; and they were grateful to the Richmond Company for allowing him to address them that night.

At the conclusion of the lecture (which was illustrated by a large number of lantern slides), questions were asked by Mr. A. BROADBENT, Mr. D. J. WINSLOW, and Mr. W. L. WESTBROOK.

The PRESIDENT remarked that the information given in connection with furnaces was of very great interest. This was a branch of the industry of which they would all have further experience later on. Producer gas in connection with canteens was a new phase. Most of them had had a good deal of experience during the war with canteen gas consumption. His own Company had been very successful in this direction. Out of six canteens in the district he supervised, five were completely gas. The one instance which was not gas was, when it started, all electricity; but gradually bits of gas apparatus went in for different purposes. Dr. Hartley had shown them how important it was that they should be able to assure themselves that they were supplying a commodity which was as nearly as possible of constant composition and pressure. As to the question of hot-water supply, with all the house-building suggestions that were being put forward, it was imperative that they should thoroughly understand this. He was sure the members would appreciate a few words from the Vice-Chairman of the Richmond Gas Stove and Meter Company, who had favoured them with his presence.

Mr. H. M. THORNTON said it was kind of the President to refer as he had done to the lecture which Dr. Hartley delivered to the Association in 1915. It was strange to think how long a time had passed since that event. They all must feel immensely thankful that they were sitting there that night as belonging to a victorious country. The President had also remarked that it was kind of the Richmond Company to allow Dr. Hartley to come and lecture to the Association, and while they must all appreciate the fact that Dr. Hartley had taken so much trouble with the preparation of his long lecture, it was not from the side of the Association that all the thanks should be given. Such occasions as this were also of great value to manufacturers, because they afforded them an excellent opportunity to realize just what was in the minds of those engaged in making and selling gas, and so helped them very much indeed in the work of investigating the various problems with which they were confronted. The lecture had refreshed his memory, and had really left him wondering at the extraordinary amount of experimental and research work that manufacturers had undertaken in the interests, not only of themselves, but of a great industry. He wished it were possible for him to convey the whole of the audience to Warrington, and there let them see the fine laboratories which the Richmond Stove Company, at great expense, had established for research and investigation, and equipped with every up-to-date instrument it was possible to buy, and a highly-trained staff. At times some men were perhaps inclined to think only in terms of pounds, shillings, and pence with regard to articles that they bought, and forgot to take into account the enormous cost to which the gas apparatus manufacturers had been put in bringing the things purchased to their present high standard of efficiency—a standard which, judged by other industries, was a particularly high one. References had appeared in the Press to the great cost of gas apparatus; but, as he had just shown, it was not only the actual cost of the material of which an appliance was made that had to be considered, but regard must also be had to the heavy outlay it had been necessary to incur to bring it to a state of efficiency. There was another thing which ought to be more generally appreciated—and this was a matter which he was intending to deal with more fully in a lecture before the Royal Society of Arts on March 10, at which he hoped many members of the Association would be present. He referred to the fact that their commodity, gas, showed a much smaller increase in price than other things. He was not absolutely sure of the figure, but believed gas had shown a rise in price of only something like 60 p.ct., while other commodities had increased by anything up to 500 p.ct. Pig iron was four times its pre-war value; and corresponding rises were shown by tin and copper, and almost everything required for manufacturing purposes. The public ought to realize that the gas industry was in this position. They should appreciate the fact—as he believed many people did—that, in consuming gas, they were utilizing a commodity which undoubtedly was the cheapest thing they could use both for domestic and industrial purposes. The gas industry ought to talk about this a little more, and then people would realize how much they had to be thankful for, in that they had not to pay for gas so much as for many other things. Dr. Hartley had devoted the greater part of his lecture to the furnace side of gas apparatus manufacture; and this was only natural, because, after all, a tremendous amount of research work had been done in this direction, more especially during the war. The war had necessitated the use of furnaces throughout the country in very large numbers. It was fortunate that the gas industry and the manufacturers had prior to the war carried out so much investigation work in connection with furnaces, because he was satisfied that it would have been far more difficult to have won the war if it had not been for the research work that had been done and the furnaces it was consequently possible to supply. They did not talk of these things enough to the public. Their industry had done more for the nation perhaps than any other; and they should let people realize this, as well as the fact that gas was going to continue to grow and to become a more important factor in the life of the country. He remarked in conclusion how very thankful they as manufacturers were for the splendid work of the British Commercial Gas Association. They would have been very much worse off now if it had not been for this wonderful organization.

The PRESIDENT said he quite agreed that the gas industry did not advertise itself as it should. The public did not yet sufficiently realize what this great industry had done for the country during the war. The Technical Press did not reach the gas-consuming public; and advantage should be taken of every opportunity that presented itself to make the truth known. On behalf of the members, he wished to thank Mr. Thornton for his remarks, and to assure both him and Dr. Hartley that the lecture had been fully appreciated. The industry had to depend upon the manufacturers for the goods by the use of which their commodity must stand or fall. The advantages of a really good standard gas were to a great extent nullified when, in its application, the results hoped for were not achieved. If all firms were like the Richmond Company, they need have little fear for the future.

Before the meeting closed, a hearty vote of thanks was passed to Dr. Hartley, on the proposition of Mr. WESTBROOK, seconded by Mr. S. E. WELLARD.

GAS-FIRED FURNACES.

"Recuperative Furnaces for Reheating" formed the subject of a lecture lately delivered by Mr. N. R. Rees before the members of the Staffordshire Iron and Steel Institute at Dudley.

The author pointed out that recently there had been criticism and comparison in connection with gas-fired and coal-fired furnaces; the conclusions arrived at being that, after every consideration had been made, the coal-fired furnace remained a good and sound proposition. His object was to prove that heating by gas, in view of the principles laid down by Siemens and others, constituted a decided progress in methods of industrial heating. It had revolutionized the steel-making industry, without taking into account radical changes brought about by its application in the matter of glass, pottery, &c.

He claimed that the Stein system of furnaces was particularly adapted to conditions requiring uniform and continuous circulation of material such as billet and ingot furnaces, forge furnaces, &c. In gas-fired furnaces equipped with this system, it was possible to produce, and maintain, a temperature high enough to heat not only iron piles, steel billets, slabs, &c., but also large ingots, to such a degree as to ensure their easy and economical rolling, also to maintain an atmosphere reducing to a minimum slagging, scaling, or oxidation—this being at least 50 p.ct. less than with the best designed coal-fired furnace. It was claimed, moreover, that the substitution of these furnaces at a French forge reduced the metal losses from 14 to 15 p.ct. down to 6 to 7 p.ct. To do this it was essential first to prevent any leakage of air into the furnace, and next to bathe the material in incandescent burnt-out gases.

From the point of view of maintenance, the Stein furnace required very low up-keep charges. Apart from the current up-keep of the bed, the furnace hearth would often last two years without repairs. Whereas two men and a charger hand were necessary for a coal-fired furnace, there were two continuous ingot heating furnaces on the Stein system, each heating over 1000 tons of steel per week; and the only hands required were a furnace man and a lad operating the charger.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

The members of the above Association visited the works of Messrs. Fletcher, Russell, & Co., Ltd., at Warrington, on Wednesday last. There was a very good attendance.

The visitors were received in the extensive show-rooms, and given a hearty welcome by the principals of the firm—Messrs. Fletcher and Rudge—who introduced to the visitors several members of the staff. The party was divided into six groups, and conducted over the works by Messrs. Knowles, Williams, Singleton, Mills, Gandy, and Landon.

The works occupy a prominent position in the town of Warrington, and are connected by private sidings to the London and North-Western Railway. The show-rooms are very extensive, and replete with a good assortment of the Company's goods. The raw materials are received and passed over weighbridges; the iron being taken direct to the cupolas, four in number, and finally running into prepared moulds.

In the stores, thousands of patterns were to be seen. Adjoining the stores is the core shop and large foundry; and a very interesting stay was made here to witness the moulding and running of the gas cookers, fires, kitchen ranges, &c., in their various parts. The grinding and polishing shops were particularly interesting. After assembling, every apparatus is carefully tested for soundness and efficiency.

The enamelling and electro-plating shops were next visited; and here many examples of the Company's goods were to be seen in the final stage of completion. The furnace department was complete with almost every type of gas-furnace, the particular use of which was explained.

After the visit the party were conducted to a café in the town, and provided with tea.

The PRESIDENT then proposed a vote of thanks to Messrs. Fletcher, Russell, & Co., for their kind invitation and the hospitality shown. Thanks were also extended to the members of the staff who had so very ably conducted the visitors through the various departments of the works.

Mr. BUTTERWORTH (Manchester) seconded and expressed his personal pleasure for the courtesy shown, and remarked that the large number

of members present that afternoon spoke for the firm and the position they held in the gas industry.

Mr. KNOWLES replied on behalf of the Company, and assured the members that their vote of thanks would be greatly appreciated.

GAS APPLIANCES—INDUSTRIAL AND DOMESTIC.

Mr. ISAAC H. MASSEY (Oldham) then read a paper entitled "Gas Appliances—Industrial and Domestic," the text of which appeared in the "JOURNAL" last week (pp. 194-5).

Discussion.

The PRESIDENT (Mr. Fletcher) congratulated the author on his paper, which was very appropriate to the occasion. He hoped the firm would see how closely they were allied, and how much depended upon them to produce good and useful apparatus. War demands had somewhat hindered their work no doubt; but things were reverting back. There was, however, a difficulty in getting appliances, the demand for which was greater than the supply. Unfortunately, most gas undertakings were somewhat handicapped by not being able to supply gas to the extent they would like.

Mr. SINGLETON remarked that coal gas as a fuel was ideal. The gas engineer would find there was a use for gas in almost all works, and that there was no problem they could not meet—"from incubation of the young to cremation of the old." During the war they had made a great number of special appliances for all purposes, even apparatus for the manufacture of poison gas. Gas had every advantage over solid fuels, and was oftentimes much cheaper.

Mr. MASSEY briefly replied to queries asked relative to his paper.

RECOVERY OF BYE-PRODUCTS OF COAL DISTILLATION IN STEAM POWER WORKS.

The following abstract of an article by Herr K. Wilhens in the "Elektrische Kraftbetriebe und Bahnen" has appeared in the "Technical Review."

The fantastic hopes which used to be based on the solution of this problem have now assumed more just proportions, and the exhaustive researches of Scheurer, Klingenberg, Kreyssig, and others have proved that the recovery of bye-products with the aid of producer-gas plant is, in steam-power works at least, rarely economically possible.

The chief aim is the separation of carbohydrates in the form of tar (5 to 10 p.ct.). Further bye-products are nitrogen (about 1 p.ct.) in the form of ammonia, and sulphur (1 to 2 p.ct.) in the molecular form or combined with the nitrogen. The most valuable tar is obtained at a gasifying temperature of 350° to 450° C. This tar has quite characteristic properties, and is now known as low-temperature tar.

The Kaiser Wilhelm Coal Research Institute has established for this tar that the essential is to avoid the combinations in process of distillation from the coal being subjected later to higher temperature than that which was required for their volatilization, and even being kept too long at this temperature. The main sources of ordinary tar—gas-works and coking plants—are thus ruled-out for the low-temperature tar, as they have to gasify the coal at much too high temperatures. Low-temperature tar recovery is at present confined to producer-gas plant, in which connection it has been brought to a high degree of perfection. However, producer-gas working, where the coal is entirely converted into combustible gases—air gas, double-gas, tri-gas, &c.—and only the ash remains as residue, is unfortunately not in general adapted to industrial firing for steam production, owing to high installation costs, considerable space and large staff required, unsuitability to fluctuating load, higher fuel consumption as against coal firing, &c. New methods must therefore be sought if the bye-products industry is to be developed. The chief technical requirements are uniform heating of the coal to 400° to 500° C., avoidance of overheating, and quick removal of the products from the hot zone. The coal must therefore be heated in thin layers, preferably in a slowly rotating drum.

Experiments made by the author are described, in which the temperature distribution and temperature rise in the coal layer were carefully measured and recorded. The temperature remains low for a considerable time, until all moisture is driven out, and then rises gradually to the maximum. [A curve is given to illustrate this.] It is therefore obviously of importance to have as little moisture as possible in the coal. Methods of protecting the retort from overheating are described. Lagging is, of course, a wasteful way of doing this; and it is preferable only to make use of the residual heat left after using the full furnace heat for another process. Thus such retorts can, in steam-boiler installations, be placed (say) between the boiler and the economizer.

To be commercially profitable, the author thinks, that, as a rough guide, the heat consumption for low-temperature tar production should not be higher than that of the coking process—*i.e.*, 10 to 15 p.ct. of the heat value of the coal treated. He goes on to describe briefly a suitable installation of retorts to be placed in the way of boiler flue gases (with their conveyors, piping, reservoirs, &c.), also the arrangements to be made for the full utilization of the retort gases, coke, &c. He calculates that in this way an average of 1 p.ct. of the coal used in steam installations may be recovered in the form of low-temperature tar.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Calculating the First Allowance.

SIR,—The correspondence on the subject of calculating the first allowance under the "Instructions" of the Coal Controller to comply with the Coal (Pit's Mouth) Order and Directions, 1919, is evidence that they are anything but "clear and unambiguous."

As the smaller works will probably find the carrying-out of the instructions more onerous than the larger ones, a simple method and correct reading would be very acceptable.

Of the two letters appearing in the issue of the "JOURNAL" for Jan. 20, the second appeals to the writer. The last paragraph seems to really cover the instructions with the least complications. At that point, the two factors required are then known—*i.e.*, the exact amount of rebates received from the 1st of December, 1919, to the 31st of March, 1920; and the exact quantity of gas sold for household and domestic purposes. Therefore:

$$\frac{\text{Rebates received} - 5\text{ p.ct. expenses}}{\text{Gas sold for household and domestic purposes in thousands}} = \text{the allowance per 1000 c.ft.}$$

Estimate for slots if desirable for rebate during the present quarter, and carry forward any surplus or deficit to the next quarter.

The reading of the third paragraph of the second letter presumes that an undertaking receives rebate off the whole of the coal carbonized for the quarter's sales. Obviously, if coal has to be used from stock, on which no rebate has been received, it cannot be refunded to the consumer.

Jan. 26, 1920. T. W.

The "Previous" Quarter—A Definite Ruling.

SIR,—In view of the controversy which has surrounded the prescription issued by the Coal Controller for dealing with the rebate of 10s. per ton of coal used for domestic purposes, the question of the interpretation of this prescription has been discussed anew with the Coal Mines Department.

It would appear that there has been considerable diversity of practice regarding the interpretation of the method proposed for arriving at the rate of the allowance to be given to domestic and household consumers for any particular quarter.

In order to ensure uniformity of practice, and to permit of the rate of the allowance being calculated at as early a date as possible, the Coal Mines Department have decided that this figure shall be calculated upon the coal carbonized and gas sold by an undertaking in the quarter prior to that for which the rate is being calculated. For instance, the rate of the allowance for the current quarter will be calculated upon the coal carbonized and the gas sold during the quarter October, November, December, 1919.

Subject to the foregoing remarks, the explanation as set out in your issue of the 27th inst. has the approval of the Coal Mines Department.

EDWARD J. FOTTRELL,
Manager, National Gas Council.

39, *Victoria Street, S.W.* 1, *Jan.* 29, 1920.

Calculating the Allowance.

SIR,—With due respect to Mr. Fottrell, I do not think that the last word has been said with his explanation in the "JOURNAL" for Jan. 27 on the method of dealing with the allowances for gas under the Coal (Pit's Mouth) Prices Order.

In the supplementary circular letter of the 2nd of January the National Gas Council say:

> It will be seen from the instruction of the Coal Controller dated the 24th of December, that gas undertakings are required to distribute to their domestic consumers only the aggregate amount of 10s. per ton rebate received in respect of coal used for the production of gas for domestic and household purposes, less an agreed percentage for expenses incurred by the undertaking. Gas undertakings, therefore, suffer no financial loss in the matter.

From this it is clear that gas undertakings are called upon to distribute only the actual amount deducted by them from the coal, less the agreed sum for expenses. The paragraph which I have quoted from the Council's supplementary letter appears to contradict the method given in clause 2 of the instructions, which speaks of coal "used." In the formula which he employs, Mr. Fottrell also speaks of coal carbonized. But supposing a gas undertaking does not receive as much coal as is carbonized in the period. It would appear from the formula that they would be called upon to distribute more by way of allowance for gas than they had received by way of rebate on coal. In other words the formula seeks to find out the rate per 1000 c.ft. of allowance to be made to domestic consumers before ascertaining the actual cash available for the purpose.

Inversely, if the gas undertaking had received supplies of coal in excess of the quantity carbonized, they would have received by way of deduction from the coal accounts more than they would be called upon to allow to customers under the formula. If it is agreed that the actual amount involved is simply the cash deducted from the coal accounts, less expenses, then it is clear that the allowance to gas consumers would vary according to the quantity of coal received in each quarter. To my mind the formula given by Mr. Fottrell does not ensure this. It would be accurate only on the assumption that stocks of coal on the dates when the Order began and closed—Dec. 1 and March 31—were equal.

Would it not be a simpler and more straightforward plan to take the total amount deducted from the coal accounts for the four months December, 1919, to March, 1920, reduce this sum by the 5 p.ct. allowed for expenses, and divide the remainder by the number of thousands of

cubic feet of gas used for domestic or household purposes during the March quarter?

Where there has been so much legitimate disagreement over the instructions, it were unwise to take up a positive attitude in the matter; but I venture to submit the following formula as a more simple method of dealing with the question of the allowance for gas.

SUGGESTED FORMULA.

Total coal received during December, 1919 .	say 1500 tons.
Total sales of gas, September quarter, 1919 .	= 75,000,000 c.ft.
Sales for domestic use, September quarter, 1919.	= 60,000,000 c.ft.
Then 75 : 1500 : : 60 : x	= 1200 tons, from which 10s. per ton shall be deducted.
Total coal received during January, February, and March, 1920	say 6000 tons.
Total sales of gas, December quarter, 1919 .	= 100,000,000 c.ft.
Sales for domestic use, December quarter, 1919	= 90,000,000 c.ft.
Then 100 : 6000 : : 90 : x	= 5400 tons, from which 10s. per ton shall be deducted.
Rebate on 6600 tons at 10s. per ton. . . .	= £3300
Less 5 p.ct. expenses	165
Amount to be distributed among users of "domestic" gas	£3135
Sales of gas for domestic purposes, March quarter, 1920	say 90,000,000 c.ft.

Then $\frac{£3135}{90,000,000 \text{ c.ft.}}$ = 8¼d. per 1000 c.ft.

F. A. GULLAND,
Maidstone Gas Company, Jan. 29, 1920. Secretary and Accountant.

[The foregoing letter should be read in conjunction with the one preceding, from Mr. Fottrell.—ED. G.J.]

National Association of Technical Gas Officials.

SIR,—This Association may supply a long-needed want for a few gas officials; but why not run it on broader lines—strike out the term "technical," and include all members of the staffs employed by the various gas undertakings throughout the United Kingdom? These would form the nucleus of a large and comprehensive combination. In fact, I would suggest carrying the idea still further, and include the staffs employed on water and electricity. This amalgamation would represent the public utility companies, and would prove of great value to the members in more ways than one.

Jan. 30, 1920. GAS ENGINEERS' CLERK.

Crude Ammoniacal Liquor for Agriculture.

SIR,—Our letter of the 5th inst. regarding the above matter was addressed with a view to obtaining information, as the term "potato diseases" is one employed to cover many affections. We have been closely investigating, without result, the effect of ammoniacal liquor on two of the more common diseases. We hoped that "Charleymange" would have been able to help us in our investigations, as we are interested in the application of any gas-works bye-products to agriculture and horticulture.

Again, may we ask him to make it quite clear as to what he means by potato disease?

SULPHATE OF AMMONIA ASSOCIATION,
Gas Offices, Fishergate, Preston, Jan. 26, 1920. A. O. BLACKHURST, Assistant Home Manager.

A Provisional Order for Ballymena.

An inquiry was held at Ballymena by Mr. A. D. Price, Engineering Inspector to the Local Government Board for Ireland, into an application by the Ballymena Urban Council for a Provisional Order to amend Article 18 of the Ballymena Gas Order, 1902, by substituting 8s. for 5s. per 1000 c.ft. as the maximum price to be charged for gas supplied, and for powers to enable the Council to acquire, if necessary, additional lands so as to extend the present gas-works, and to erect additional buildings and appliances in the manner set out in the ground plan lodged with the application. Mr. H. O'Hara, the Town Clerk and Surveyor, stated that to meet the increased demand for gas and for the proper and economical working of the undertaking a general extension of the carbonizing and purifying plant was imperative. In 1918-19, the net cost of gas manufacture was 5s. 4d. per 1000 c.ft., to which had to be added 1s. 3d. capital charges on a loan of £13,078; so that approximately 6s. 9d. was the cost for 1000 c.ft. of gas. The Inspector asked why they were applying for 8s. if it could be done on 6s. 9d. Mr. Caruth, the Solicitor for the Council, said there would be another demand for an increase of wages. Mr. O'Hara said he could not give the actual figures; but they anticipated that expenditure would increase. It might never be necessary to charge the maximum. Mr. Caruth submitted figures—which, however, were not to be taken as authentic—showing that for the year 1919-20 the total expenditure was £10,181, and the total receipts £8498—a loss on the year's working of £1683. The figures giving the price of gas as 6s. 9d. were for 1918-19; and during the last year there were two further increases of wages. The Inspector said he was afraid he could not make a recommendation on the evidence that had been placed before him. The Town Clerk suggested in that case they would have to be satisfied with 7s. 6d. He must, he added, make provision for eventualities.

Fusing of Electric Wires.—A fire believed to have been due to the fusing of electric wires has destroyed the fine Roman Catholic Church, Rathmines, Dublin. Only the outer walls remain standing; the fire brigade being unable to save the roof and interior of the building.

REGISTER OF PATENTS.

Incandescent Gas-Burners.—No. 135,445.

TODD, J. F., of Liverpool.

No. 17,296; July 10, 1919.

This device for applying to inverted incandescent gas-burners with a view to distribute the gas on the sides of the mantle, increase its life, and improve the light given thereby, consists of a stem adapted to grip on to the burner end and carrying a plate at its outer end to lie just within the end of the mantle, so as to prevent the gas from impinging on this end of the mantle and guide it outwards towards the sides of the mantle. The device is independent of, and separate from, the mantle—in contradistinction to known devices in which a large inverted mantle is partly supported by an internal central support serving to deflect the gas-flame and cause it to take up a cup-shaped form. The device consists of a strip of metal having a shank and side piece bent round to form a "springy ring," which is adapted to securely engage within the end of the mantle in the usual manner. The shank is preferably twisted to impart a spiral motion to the gas issuing from the burner, and cause "better distribution of the gas over the inside surfaces of the mantle."

Diaphragms for Dry Gas-Meters.—No. 136,687.

SMITH, E. W., of Kennington Park Road, S.E.

No. 1725; Jan. 23, 1919.

This invention relates to dry meter diaphragms of the kind comprising an annular leather the centre of which is closed by a metal plate held to the leather by metal rings gripped upon the leather, and to which the plate is soldered. It is designed "to generally facilitate and improve the manufacture of these diaphragms and to provide larger capacity in proportion to the external case dimensions than has hitherto been usual." The leather is gripped between the innermost edge of a metal ring and another ring bent over the edge; and it has the distinguishing feature that the outermost edges of the metal rings are splayed away from each other, so that the leather has freedom of movement between the edges.

The central disc is soldered to one of the metal rings at its outer edge for the purpose of preventing liability to scorching the leather between the rings; and the splaying prevents pinching the leather at its working point. The outer edge of the leather is attached in any convenient manner to a deep rim and soldered into the meter in the usual way; the opening in the metal rings permitting sufficient room to get the soldering iron through.

Carbonization of Fuel by Vertical Coke-Ovens. No. 136,880.

DAVIES, W. E., of Penygraig, South Wales.

No. 21,239; Dec. 19, 1918.

This invention relates to a coke-oven or like distillation apparatus for carbonizing or distilling solid carbonaceous or organic materials, either intermittently or continuously.

The main feature of the invention is a construction of side walls containing vertical flues in sets of three—one being a heating flue and the others waste-heat flues. The flues are so connected that heated gases which have traversed the heating flue pass directly through both waste-heat flues—preferably in proportion determined by setting a suitable valve together with the draught in each set of flues.

The construction and details appertaining to the invention are not further described apart from a series of eight sheets of lettered drawings.

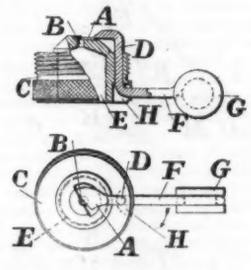
Gas-Burners.—No. 136,988.

SMITH, H. C., of Erdington, Birmingham.

No. 8313; April 2, 1919.

This invention (relating to gas-burners of the incandescent type) has for its object to provide means for adjusting or regulating gas-jets to suit varying conditions and requirements.

The arrangement is shown in part sectional elevation on an incandescent gas-burner nipple and in plan.



Smith's Incandescent Burner Regulator.

The jet adjuster is made from phosphor bronze or other wire having one end flattened to form a sliding plate A to pass over an orifice B formed in the outlet end of the gas-nipple C. The wire is bent at right angles to form a stem D, which is inserted in an aperture drilled longitudinally through the nipple, parallel with the gas-way E, but having no communication with it. The wire is also bent at right angles to form a lever F; and its outer end is attached to a finger grip G. Ad-

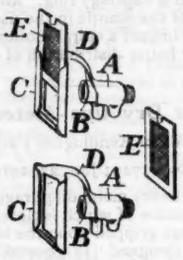
jacent to the lever is a recess H, formed with an open side so as to provide an abutment at one side to limit the opening movement of the lever. It serves also to prevent the adjuster moving beyond the adjacent end-face of the nipple so as to obstruct the screwing of the nipple on to the gas supply fitting in the ordinary manner.

Incandescent Gas Lighting Apparatus.—No. 137,141.

WOOD, E. A., of Birmingham, PERRY, F., and INDUSTRIAL INVENTIONS, LTD., of Tipton.

No. 2474; Jan. 31, 1919.

This modification of patent No. 125,880 comprises the combination of a holder formed with a clip for attachment to a burner, with a rectangular frame grooved around three edges, and a separate mantle frame formed by folding a pierced sheet upon itself—the mantle being inserted between the parts of the mantle frame, with the latter removably mounted in the grooves of the holder frame E.



Wood and Perry's Incandescent Burner Attachment.

The holder shown is produced from a strip of metal provided with three integral parts—a clip A, which grips the burner B on which the holder is mounted; secondly, a mantle support C; and thirdly, a stem D connecting the other two. The mantle support is in the form of a rectangular frame having three of its edges turned over to form a groove around the face of the support remote from the burner. The flat "mantle" E is carried in a detachable frame F.

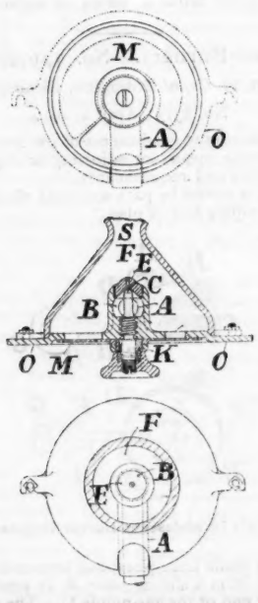
Regulating the Air and Gas Supply to Incandescent Gas-Fires.—No. 137,014.

GEORGE, T. A., of Newcastle-upon-Tyne, and MURRAY, F., of Stratford, Essex.

No. 16,037; June 25, 1919.

In a regulator in accordance with this invention the air-regulating sector valve is mounted on the spindle of the gas-regulating needle valve so as to permit endwise movement of the needle valve relatively to the sector valve, which latter is pressed to the face, against which it works by a spring that prevents the passage of air behind the valve, and is rotatably adjustable relative to the spindle of the needle valve for the purpose of varying the ratio of air to gas in the mixture passing to the burners. The seating for the needle valve is also adjustable relatively to the needle valve to take-up wear.

One construction of the regulator (particularly designed for application to an incandescent gas-fire) is shown in a front elevation, sectional plan, and rear view.



George and Murray's Incandescent Gas-Fire Regulator.

A is the gas supply pipe which opens into a chamber B containing a needle valve C, which controls an orifice in the top of a screwed plug E forming the seating for the valve. The orifice leads to a mixing-chamber F. The spindle of the needle valve is formed with a coarse thread, and is provided with a knob below so that it can be rotated. The screwed plug allows of adjustment of the valve-seat relatively to the needle valve.

On the spindle of the needle valve is mounted a threaded collar K on to which is screwed a sector M adapted to co-act with an aperture in the plate O—the usual front plate of an incandescent gas-fire. The spindle is provided with a projection engaging a recess in the collar, which ensures that the collar and sector shall rotate with the spindle, but permits of endwise movement of the spindle relatively to the collar and sector. A spring in a recess in the knob presses upon the collar and maintains the sector in close contact with the plate O. The sector can be adjusted on the collar to vary its position relatively to the aperture in the plate. Thus rotary adjustment of the knob will move the needle valve C towards or away from its seat, and will simultaneously move the valve M to cause it to cover or uncover the aperture. By shaping the aperture so that the ratio of the aperture uncovered by the sector to the area of the opening of the orifice in the screwed plug by the needle valve C remains constant as the knob is adjusted, the supply of atmospheric air to the chamber F will be automatically increased or decreased as the supply of gas is altered. The chamber F is formed with a restricted outlet S, so that the jet of gas from the orifice below draws in the air. The outlet S leads to the burners

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Jan. 28.]

Nos. 1611—2341.

AMERICAN COKE AND CHEMICAL COMPANY.—"Coke-ovens, &c." Nos. 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2326.
AMERICAN COKE AND CHEMICAL COMPANY.—"Ammonia saturators." No. 2325.
BROWN, E. S.—"Gas-stoves, &c." No. 1614.
BURTON, W. J.—"Gas-producers." No. 1808.
CARTER, D.—"Meters for measuring liquids." No. 2063.
CASTELLI, S. T. S.—"Means to generate gases from coal, &c." No. 2060.
CORTHESY, J. H.—See Castelli. No. 2060.
CRACKNELL, T.—"Rise-and-fall gas-pendants." No. 1954.
DUCKHAM, SIR A. M.—"Apparatus for screening coke, &c." No 1685.
DUCKHAM, SIR A. M.—"Gasholders." No. 2112.
DUCKHAM, SIR A. M.—"Manufacture of mixtures of pulverized fuel with tar, &c." No. 2315.
DUNKER, L.—"Apparatus for purifying gas." No. 2209.
FABRY, R.—"Process for purifying coal gas." No. 2050.
GLEDHILL, R.—"Coal-carbonization retorts." No. 1886.
GRIFFIN, H. W.—"Gas cooking-stoves, &c." No. 1726.
HAILWOOD, E. A.—"Gas or air valves." No. 1920.
HARRISON, H. T.—"Means for directing and distributing light." No. 2110.
HOLLINGS, H.—"Manufacture of gas fire radiants." No. 1979.
HUDSON, F. H.—"Gas fire or stove." No. 1744.
KENNEDY, A. R.—"Rotary compressors, &c." No. 1870.
LEE, H. W.—"Rotary distributing-valves." No. 1696.
LEONTIEFF, J.—"Apparatus for measuring the pressure of gases, vapours, and liquids." No. 2153.
LYNCH, W. H.—"Reflection and distribution of light." No. 1649.
MORRIS, C. V.—See Kennedy. No. 1870.
MORRIS, J. M.—"Gas-generating apparatus." No. 2333.
PRESTON, D.—"Gas power unit for supplying driving-power to turbines." No. 1869.
ROACH, P. J.—"Meters for measuring liquids." No. 2063.
RYAN, F. J.—See Roach. No. 2063.
SHERINGHAM, G. H.—"Artificial illumination." No. 2235.
SOUTH METROPOLITAN GAS COMPANY.—"Gas-producers." No. 1808.
SOUTH METROPOLITAN GAS COMPANY.—"Manufacture of gas-fire radiants." No. 1979.
WATCHMAN COMPANY.—"Gas-generating apparatus." No. 2333.
WOODALL, DUCKHAM, & JONES.—See Duckham. No. 1685.
WOODALL, DUCKHAM, & JONES.—See Duckham. No. 2112.

Sunderland's Cheap Gas Supply.—The Sunderland Gas Company have reduced the price of gas to domestic consumers 10d. per 1000 c.ft., beginning from December last. This reduction brings the figure down to 1s. 5d. per 1000 c.ft., which is believed to be the lowest charge in any town in the country. The Company's lowest price to the domestic consumer prior to the war was 1s. 10d. per 1000 c.ft. gross.

Price Increased at Wolverhampton.—The Wolverhampton Gas Company have given notice that, owing to the increase in railway rates, and a further rise in the wages of employees, as well as the constant advance in the cost of materials, the price of gas will be increased, as from the next reading of the meters. They, however, state that the charge to domestic consumers will be subject to a rebate in respect of the reduction in the price of coal.

Coke Profiteering Case Collapses.—What promised to be a Gilbertian situation under the Profiteering Act, at Bradford, failed to materialize, owing to the complainant, a person named Scott, failing to attend to substantiate his accusation against the Corporation Gas Department of charging too much for coke. As a result, the case was dismissed. The Corporation being the defendants, all members of the Committee representing that authority—and they are the majority—had to retire under the provisions of the law. This left the case to be judged by the remainder, nearly all of whom are local retail traders. This group promptly elected the President of the Chamber of Trade (Mr. Fred Pickering, J.P.) as Chairman for the occasion. Quite an interesting situation would have developed had the matter gone forward.

MISCELLANEOUS NEWS.

LONDON COUNTY COUNCIL AND GAS BILLS.

Opposition Proposed.

The report to be submitted by the Parliamentary Committee to the London County Council to-morrow mentions the clause in the Great Northern Railway Bill which proposes to empower the Company to purchase gas, water, and electrical energy where they please, and to convey it to any part of their property. It also refers in the following terms to the—

South Metropolitan Gas Bill.—This Bill proposes, *inter alia*, to enable the South Metropolitan Gas Company to sell gas on a heat-unit basis, to alter the sliding-scale of price and dividend, and to extend the powers of the Company to amalgamate with, or purchase, other undertakings.

South Suburban Gas Company Bill.—This Bill empowers the South Suburban Gas Company to raise additional capital up to £500,000 by the creation and issue of new ordinary stock or new preference stock (or partly by one method and partly by the other) and to borrow on mortgage of their undertaking up to one-third of the additional capital created and issued, to sell gas on a heat-unit basis, and to alter the sliding-scale of price and dividend.

Wandsworth, Wimbledon, and Epsom District Gas Bill.—This Bill empowers the Company to erect gasholders and store gas on certain lands in the Metropolitan Borough of Wandsworth, to discontinue a public causeway adjacent to the "Waterman's Arms" and on the eastern side of Waterside Wharf in the same borough, to raise additional capital by the creation and issue of preference stock up to a total of £500,000, and to borrow on mortgage of their undertaking up to one-third of the amount of preference stock created and issued.

A group of Bills are named, including the three Gas Bills, to which opposition should be made under the provisions of the Borough Funds Act, 1873. Notice is therefore given that the question of opposing these Bills will be considered at the meeting of the Council on the 10th inst.

The report remarks, with regard to the Bills to be promoted by the South Metropolitan and South Suburban Gas Companies, that it may be mentioned the Board of Trade has signified its intention of introducing a Bill to apply to gas undertakings generally the recommendations of the Fuel Research Board included in their recent report to the Board of Trade on gas standards, whereby gas would be charged for according to the actual number of heat units supplied to the consumer instead of by volume as at present. The Bill will necessarily provide a revision of the sliding-scale to meet the changed conditions of charge; and it is understood that the President of the Board of Trade has, at the instance of the gas industry, promised to consider the question of a revision which will give an added benefit to the shareholders.

The Committee are not recommending the Council at the present time to take any action in respect of the Great Northern Railway Bill.

BRENTFORD GAS COMPANY.

Report and Accounts.

The Directors will report, at the annual meeting to-morrow, that the accounts show a profit on the revenue account for the year ended Dec. 31 of £75,230. After providing for the interim dividend to June 30, and fixed charges, there remains the sum of £14,676, which, with the balance brought forward, makes the amount of £75,332 available for dividends. The Directors having applied to the Board of Trade, and received their sanction to pay dividends under the Statutory Undertakings (Temporary Increase of Charges) Act, 1918, recommend the declaration of dividends, subject to income-tax—namely: At the rate of 5 p.ct. per annum on the preference stock; at the rate of 3 p.ct. per annum on the "A" consolidated stock; and at the rate of £2 12s. 6d. p.ct. per annum on the "B" consolidated stock. The price of gas was raised on Oct. 1 to 4s. 10d. per 1000 c.ft. The increase of gas sold was 4·28 p.ct. over the previous year. The number of consumers is 122,988, as against 121,903 a year ago. The Bill promoted by the Company in 1918 received the Royal Assent on April 16, 1919.

From the accounts accompanying the report, it is seen that the revenue from the sale of gas amounted to £895,868; from rental of meters, stoves, and fittings, to £103,153; and from the sale of residual products, to £233,354—the total receipts being £1,232,538. The expenditure on the manufacture of gas was £919,416; on distribution, £127,428; on management, £34,049; on rent, rates, and taxes, £52,083—the total expenses being £1,157,308. The balance carried to the profit and loss account is £75,230.

The working statements indicate that 235,360 tons of coal and 2,125,268 gallons of oil were used in the past year in the production of 4,780,073,000 c.ft. of gas (including 2,086,553,000 c.ft. of carburetted water gas), of which 4,278,007,000 c.ft. were sold and 4,348,780,000 c.ft. were accounted for.

Gas-Works Inquiry at Spalding.—An inquiry has been held at Spalding, by Mr. M. K. North, on behalf of the Ministry of Health, into an application by the Spalding Urban District Council for sanction to borrow the sum of £8500 for gas-works purposes; the money being required to pay off an existing deficit, and to provide a balance for working capital. There was no opposition; but the Inspector suggested that the loan could only be granted for a short period, probably for five years. The Council asked that it should, if possible, be for a longer time.

MANUFACTURING CONDITIONS AT RAMSGATE.

Water-Gas Plant Recommended.

Early in December, the Ramsgate Corporation Gas and Water Committee, in view of the shortage of gas, decided to call in Mr. W. Doig Gibb to examine the gas plant, methods of working and management, and the results obtained. Mr. Doig Gibb has now made his report, in which he says the existing carbonizing plant is practically obsolete, and recommends the installation of a carburetted water-gas plant, at an estimated cost of £10,500. This plant, he points out, could, when the Engineer (Mr. W. Thomson) first suggested it, have been secured for about £4500.

As to the condition of the plant, Mr. Doig Gibb says: With costs of labour and material as they are to-day, your carbonizing plant is entirely obsolete, and no prosperity can be looked for till this is remedied. No exception can be taken to the design and capacity of the rest of the gas-works plant. The general condition of your works reflects war wear, when labour and material were not available. With more labour now available (at a price), this will be, and is being, remedied. The condition of the plant itself is better than in many other works, though the spectacular effect of the bomb-shattered roofs over the purifiers and scrubbers, &c., is apt to lead to the belief that the works generally are in worse condition than they really are. Lack of labour, less efficient labour, poor quality of coal, and consequent poorer coke for furnace heating, and irregular qualities of coal supplied, have been factors in preventing, at some periods, the delivery of a standard quality of gas at efficient pressures. Another difficulty has been the inability to keep the retort-settings in their usual state of repair. This latter can be, and is being, remedied; but proper working conditions will be difficult of accomplishment as long as the Coal Controller has the right to supply any class of coal into the works. This, undoubtedly, was the principal cause of the recent gas shortage. It must be remembered that retorts have to be fired-up for some days before they can produce gas; and a consignment of good coal was followed, on this occasion, by another consignment of wet and poor coal, which probably yielded not much more than half the quantity of gas per ton. It is also probable that the labour unrest has been partly responsible for some of the failures or partial failures. I may, however, state that it has been the exception, rather than the rule, for any gas undertaking to have been able, through the last six years, constantly to supply a standard quality of gas at efficient pressure.

He proceeds to point out that the results between 1913 and 1918 did not vary very materially, and that they reflect the care and anxiety which must have been shown by the management. But he views with some alarm the increasing percentage of unaccounted-for gas during the last few years, and suggests that some extra attention may be required for the street-mains, though it is likely that the meters are recording slow in many cases. As to financial results, the prosperity of pre-war years could not, of course, be maintained. Figures are given which show that, per 1000 c.ft. of gas sold, as between 1914 and 1919, the cost of coal has increased from 20·96d. to 43·26d., or over 106 p.ct. Working expenses have increased from 15·52d. to 25·07d., or about 60½ p.ct. Residuals have only increased from 10·93d. to 17·28d., or about 58 p.ct.; while the capital charges (due largely to the decreased output) have risen from 8·24d. to 15·96d., or over 93½ p.ct. The only way to meet these increased costs was by raising the price of gas from time to time; and hence the present position.

Continuing, Mr. Doig Gibb says that, from the point of view of capacity, no new plant is required; but the existing plant is obsolete both as regards results and cost of working. Any considerable renovation of it on the same lines would be waste of money. Per 1000 c.ft. of gas made, wages have increased from 2·89d. in 1913 to 5·82d. in 1919. Repairs and maintenance costs on works have increased from 2·31d. in 1913 to 4·70d. in 1919. In the present financial year, wages will be higher, on account of further increases in rates, and by the reduction of the amount of work done per man. The present carbonizing plant will become more and more expensive, since the quantity of labour required is so excessive.

The future programme, in ordinary circumstances, would be the erection of vertical retorts adaptable for "steaming," and the scrapping of the present system. But the times are not ordinary. A one-million vertical retort installation complete would cost, at present prices, about £78,000. Its use would cut-down working costs, but it is not at present a commercial proposition, when it is remembered that it would be a replacement of old plant, and not an addition thereto. Even a half-million plant to take up the bulk of the work (apart from the heaviest winter load) would cost, with preparation for future extensions, about £42,000. This, also, I cannot recommend at present. One trouble of such a proposition would be to get hand stokers to man the old benches for a limited time only in each year.

His opinion is that the Corporation should, as soon as possible, erect a carburetted water-gas plant of a daily capacity of 500,000 c.ft. Such a plant is worked with a minimum of labour, and has the great advantage of being quickly brought into action when required. It is, Mr. Doig Gibb remarks, to be regretted that such a plant has not already been erected. When the engineer first proposed it, the order could have been placed, and priority secured, at a cost, complete, of about £4500. It will now cost about £10,500. But even so, he recommends them strongly to proceed. It is a difficult time to estimate; but, from figures which he has got, it should be possible to turn out gas at a cost for wages and maintenance of about 4½d. per 1000 c.ft., as against the present cost (and it is a rapidly increasing one) of 10·52d. After such a carburetted water-gas plant is erected, the possibility of displacing the then existing horizontal retorts by vertical retorts should not be lost sight of.

Mr. Doig Gibb thinks it would be highly desirable to secure and keep in constant use a self-recording calorimeter. This would be a guide to the men in maintaining a more or less uniform quality of gas; and it is a "tell-tale" by which the management can always see what has happened when they are not on the works—as, for instance, through

the night. He proceeds: As regards the handling of the existing plant, the methods are up-to-date and efficient. During a short visit, it is not possible to accurately gauge the relationship between management and workmen; but the respect with which the engineer was received wherever he went, and the absence of any sullenness on the part of the men whom I saw, led me to believe that the relationship was as good as it was possible to be in these unrestful times.

At a meeting of the Accounts Committee, it was agreed to continue a Sub-Committee appointed last November, to assist in the carrying out of the recommendations contained in the report; and the report of the Accounts Committee has been adopted by the Gas and Water Committee. Mr. Soans declared that the members of the Committee, the Engineer, those responsible for the policy generally, had strained every nerve to contend with a most difficult position. He enumerated the many difficulties with which they had been confronted; and added: "With regard to the vindication of their Engineer, the report furnished by one of the most eminent gas experts in the kingdom would completely absolve Mr. Thomson from any fault which the public might feel inclined to attribute to him with regard to the present position." Alderman Coleman also said the report conveyed the idea that Mr. Thomson had done everything he could to keep the works up to date with the material he had at disposal. Figures proved that the undertaking had been successfully managed in the past, and had been of considerable value to the town.

MINISTRY OF HEALTH INQUIRY AT DENTON.

Loan for Gas-Works Purposes.

Major J. STEWART, R.E., conducted an inquiry on behalf of the Ministry of Health, at the Town Hall, Denton, last Friday, into an application by the Urban District Council for a loan of £40,000 for gas-works purposes. There was no opposition.

Mr. WILLIAM RICHARDS (Clerk to the Council) stated that the works were acquired by the District Council in 1884. The area supplied comprised the urban district of Denton; and of the 4414 houses in the area, 3957 were supplied with gas. The present price charged was 5s. per 1000 c.ft., with a scale of discounts for large consumption under which the biggest consumers obtained gas at 4s. 7d. During the war the works got into a very bad state, owing to the inability to effect necessary repairs, with the result that it became impossible to meet the demands for gas. The Council called in Mr. William Buckley, Gas Engineer, of Droylsden, Manchester; and he reported that the conditions were very unsatisfactory, and recommended reconstruction of the carbonizing and primary purification plant.

Mr. BUCKLEY put in his report on the works dated April 14, 1919. His recommendations, which were adopted by the Council, comprised an installation of sixteen vertical retorts capable of making 500,000 c.ft. of gas per day, rotary exhausters in duplicate, a tar-extractor, and a rotary washer-scrubber. He estimated that the savings to be effected by the new plant (which would cost £30,818) would amount to £8302 per annum. In addition, a sum of £9000 was required for meters and stoves.

Mr. J. H. BREARLEY, M.Inst.C.E., supported the application. The Council had, he said, acted prudently in proceeding with the reconstruction forthwith; and the cost would be appreciably less than if the required sanction had been waited for before proceeding to let the various contracts. He anticipated that the output of gas, which had dropped from 92 million c.ft. in 1913 to 63 million c.ft. in the year ended March 31, 1919, would immediately revert to the former figure when the alterations were completed and the undertaking enabled to meet the requirements of the district. He put in a table showing in detail how the various items of expenditure were made up. The principal item was £26,400 for vertical retorts and alterations to the existing retort-house. An overhaul of the meters was urgently necessary; there being no less than 3322 meters out of a total of 5376 which were of only two-light capacity. These were too small for supplying gas where it was used for other purposes than lighting. A sum of £4500 was asked for on account of new meters; and he did not think this would carry the undertaking over more than five years. Up to the present, no cookers had been supplied on hire; and it was desirable that this potential source of rerenue should be developed. For new stoves a like sum of £4500 was therefore needed. Excluding the £9000 for meters and stoves, which would bring its own increment of consumption, the amount of unredeemed capital at the end of the first complete year after the new works had begun to operate would be equivalent to £900 per million, a figure which, under present conditions, and having regard to the fact that the works would be equipped with the most up-to-date labour-saving devices, he regarded as quite reasonable.

Mr. H. C. HANDLEY (the recently appointed Manager) presented pressure charts showing the difficulties under which the supply of gas was being carried on at the present time.

The proceedings then terminated; and the Inspector subsequently visited the works.

GAS AS FUEL FOR MOTORS.

An Abortive Competition.

Four years ago the Executive Committee of the Automobile Association offered a prize of £1000 for the best system of utilizing coal gas as an alternative to petrol for motor vehicles. The conditions broadly called for an installation capable of carrying, under compression, a charge of coal gas sufficient to run a touring car of medium size a distance of 50 miles (about the equivalent of 3 gallons of petrol); the gas-

USE Simmance's

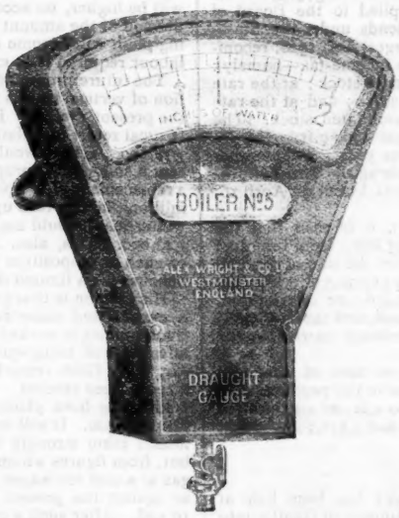
DEAD BEAT INDICATORS

instead of WATER-TUBE GAUGES and

"READ THE PRESSURE BY THE POINTER."

No liquid to evaporate and no levels to adjust.

No glasses to break and nothing to clean.



Direct reading, Open scale, Any range (Pressure, Vacuum, or Combination).

Incorrodible, Accurate, for foul or purified gas.

MADE IN MANY RANGES WITH TABLETS LETTERED AS DESIRED.

ALEXANDER WRIGHT & CO., LTD., WESTMINSTER.

Agents: Australia—FYVIE & STEWART, 360, Collins St., Melbourne; Canada—W. P. ROPER, 502, Merchants' Bank Building, Montreal.

containers not to occupy more than 19 c.ft., nor to weigh more than 140 lbs. The retail price was fixed at £20, or an annual hiring charge of £5; and it was further stipulated that the material used was to be of such a nature as to be easily obtained, and that the apparatus was to be capable of being installed by ordinary motor-car repairers. The prize and conditions were made widely known; and entries were received, not only from the United Kingdom, but also from India, Australia, the United States, and the fighting fronts. The last date for receiving entries, as originally fixed, was Dec. 31, 1918; but the period was extended a month.

Careful examination of the specifications sent in disclosed that only eleven appeared to comply with the conditions laid down. These competitors were requested to forward their plants, &c., for testing purposes not later than May 6, 1919; but when this date had arrived no apparatus had been received. It was then decided again to extend the time—to Sept. 30. This extension was also unavailing, though one of the competitors reported that the railway company could not accept his plant for transit, owing to the strike. Nothing more was heard of the apparatus until the end of November, when the Association were told it had been seriously damaged on the railway.

The result of the competition has shown that there is not at the present time any effective apparatus for dealing economically with gas for motor-car purposes; but the Association are still open to receive ideas and models, quite apart from the competition, and will give them their best consideration. Cannot some gas engineer earn immortal fame by inventing the apparatus required?

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Feb.* 2.

In the London market, pitch monopolizes attention. The position is very strong because of the large demand; and the value still tending upward. It is reported that 110s. net per ton f.o.b. makers' works has been paid. Creosote remains at about 9d. net per gallon in bulk. Toluol, solvent naphtha, and benzol are unchanged in value. Anthracene, 40 p.ct., is worth 9d. per unit net, casks free.

Sulphate of ammonia for home agriculture remains at the price and terms officially arranged.

Tar Products in the Provinces.

Feb. 2.

The average values for gas-works products during the week were: Gas-works coal tar, 57s. 9d. to 62s. 9d. Pitch, East Coast, 97s. 6d. to 102s. 6d. per ton f.a.s.; West Coast—Manchester, 85s. to 90s.; Liverpool, 85s. to 90s.; Clyde, 97s. 6d. to 102s. 6d. nominal. Benzol 90 p.ct., North, 2s. 3d. to 2s. 4d.; crude 65 p.ct. at 120° C., 1s. 4d. to 1s. 5d. naked at makers' works; 50-90 p.ct. naked, North, 1s. 10d. to 2s. Toluol, naked, North, 2s. 1d. to 2s. 2d. nominal. Coal tar crude naphtha in bulk, North, 9½d. to 10d. Solvent naphtha, naked, North, 3s. 1d. to 3s. 3d. Heavy naphtha, North, 2s. 11d. to 3s. Creosote, in bulk, North, liquid, 7d. to 7¼d.; salty, 6¾d. to 7d. Heavy oils, in bulk, North, 7¾d. to 7⅞d. Carbolic acid, 60 p.ct., 3s. 3d. to 3s. 6d. Naphthalene, £18 to £22; salts, £6 10s. to £7 10s., bags included. Anthracene, "A" quality, 7½d. to 8d. per minimum 40 p.ct.; "B" quality, nominal.

Manchester District Tar Prices.

The average price realized for tar in the Manchester district, based on the value of the products, for the month of December was £3 7s. 7·3d.

FROM A MARKET CORRESPONDENT.

Tar Products.

There is practically no change in markets. A good demand is maintained for pitch. Although South Wales buyers are kicking against the advance which is taking place, they seem to expect some preferential treatment. They buy by fits and starts; and their abstention from the market is not likely to have any effect. The demand for prepared tar is good, and high prices are asked. Creosote is dearer on the heavy demand, and up to 10d. per gallon is reported paid in some districts. Such a price would, of course, prevent export business. Certainly extravagant prices are being paid, and a further advance is being looked for. Retail prices of benzol have been advanced 4d. per gallon in sympathy with petrol. Many makers, however, think a rise of at least 7d. is justified. Naphthalenes are quietly firm. The higher sorts are selling well at full rates; but it is becoming more difficult to place lower sorts of crudes, this being the period of greatest production. Solvent naphtha is steady without much change. It is reported that 3s. 6d. has been paid up to the end of the year; and the future is regarded favourably—there being many who look for 4s. per gallon within a few months. Carbolic acid is unchanged, and no confirmation is available of reports that exports were to be prohibited. The demand for most intermediates is heavy. Manufacturers will not now quote for forward delivery, owing to the uncertainty of the situation, while no spot parcels are available.

Latest quotations are as follows:

Benzol: 90% London 2s. to 2s. 2d., North 1s. 11d. to 2s.; 50-90% 1s. 9d. to 2s. London, 1s. 10½d. North; crude, 60-65% 1s. 5d. to 1s. 7d.; pure, 3s. per gallon naked.

Crude Tar: London, 60s. to 65s.; Midlands, 53s. to 60s.; North, 57s. to 60s. per ton *ex* works. Refined tar, 34s. 6d. per barrel (free) on rail.

We are exhibiting at the Ideal Home Exhibition, Olympia, Feb. 4th to 25th. Stand No. 15.

We are exhibiting at the British Industries Fair Birmingham, Feb. 23rd to Mar. 5th. Stands Nos. 74/75.

The "Main" Circulating Water Heater.

No. 424. The "Energy."
Stands can be supplied to any desired height.

THIS Gas Heater is constructed throughout of strong cast iron with corrugated inner and outer jackets giving an unprecedented heating surface. The gases, after heating the inner jacket, are drawn to the base, and to reach the flue outlet must travel over the outer casing, thus utilising the heat to the utmost.

A really efficient thermostat is fitted; and the heat-retaining outside casing is made of steel, porcelain enamelled, giving the heater a most attractive appearance.

A sample will convince you of its efficiency.

R. & A. MAIN, LTD.

WORKS: Gothic Works, EDMONTON, N.18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W. 1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 6, Narrow Wine Street, BRISTOL; 333, Queen Street, MELBOURNE.

Pitch: London, 95s. to 100s. per ton; East Coast, 87s. to 95s. per ton; West Coast, 90s. to 92s. 6d., with Manchester 90s. per ton, and Glasgow 92s. 6d. per ton; South Wales, 105s. per ton.

Solvent Naphtha: London, 3s. 6d. Provinces average 3s. 4d. per gallon.

Crude Naphtha: Naked, 9d.; North, 8½d. per gallon.

Heavy Naphtha: 2s. 6d. per gallon.

Naphthalene: Refined, £23 per ton nominal; crude, £8 to £11, according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North, 2s. 7d. Pure, 3s.

Creosote: London, 8½d.; North, 7⅞d. to 8d.; heavy oil, 7½d. per gallon in bulk.

Anthracene: 40-45%, 9d. per unit per cwt.

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Business continues fully up to average, and the good inquiry looks like continuing. Home users are taking most of the output; and there seems to be little hope of any big export business, although the latter may possibly show some advance on a year ago. Some sales have been made for shipment between April and June next; but only limited quantities are available for this period. Business is also recorded for March shipment to British Colonies, at £33 per ton f.o.b. United Kingdom ports.

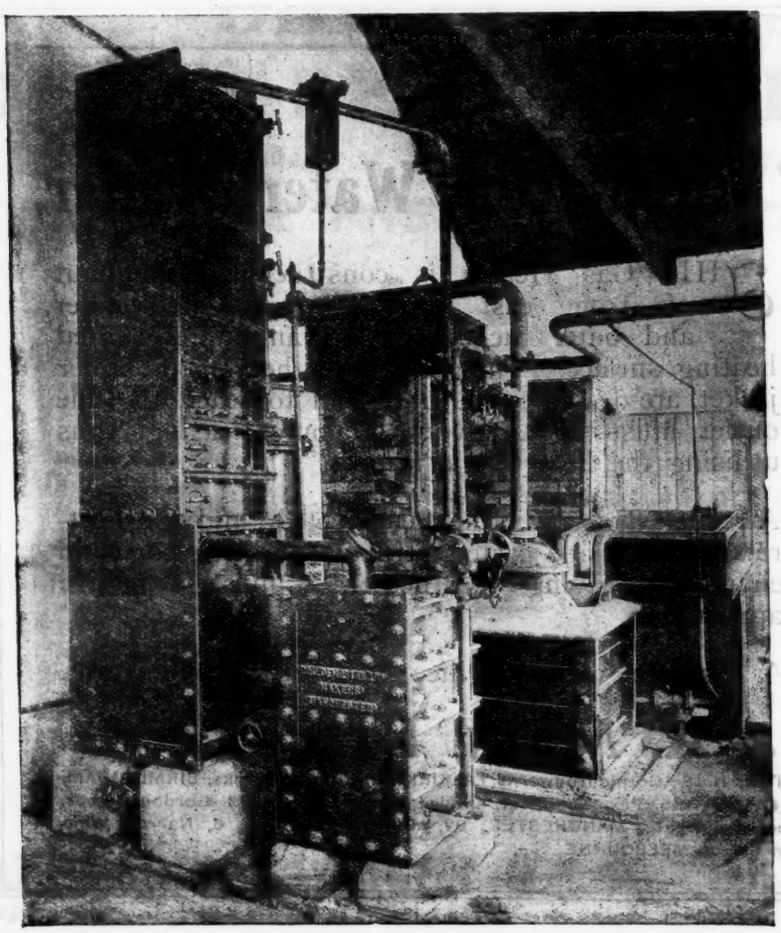
Coal Position at Coventry.—Alderman Batchelor (the Chairman of the Gas Committee) told the Coventry City Council last week that the weekly deliveries of coal had so fallen off that it had been necessary to ask the consumers to exercise the utmost economy in the use of gas. Authority was also given for a reduction of pressure between the hours of 8 p.m. and 6 a.m. Fortunately it had not been necessary up to the present to utilize this means of restricting the supply. It was resolved to ask the help of the Chamber of Commerce to supplement the efforts of the Gas Committee in bringing pressure to bear upon the Coal Controller for increased supplies, and to cease diverting to other works coal bought by the Coventry Gas Department. The result of these efforts was an increase in the weekly deliveries of coal, though they were still drawing heavily from the depleted stocks. During the five weeks ended Jan. 9, 4870 tons of coal were taken from stock; but this had been reduced in the past two weeks to 450 tons per week. Though the position had much improved since the early part of January, it was still very serious, as there was less than a week's supply of coal in stock, and the Gas Committee desired to emphasize the importance of economy in the consumption of gas.

Property Belonging to German Subjects.

Now that the Treaty of Peace with Germany has come into force, the Board of Trade again draw attention to the Order in Council under the Peace Treaty with Germany (Treaty of Peace Order, 1919), copies of which may be had upon application to His Majesty's Stationery Office, under which all the property, rights, and interests which are situate anywhere within the British Empire belonging to German nationals at the date when the Treaty came into force, irrespective of where the owner or owners may be resident, are charged for the purpose of securing the claims made by British nationals with regard to their property in Germany and debts owing to them by German nationals. The charge does not extend to any property which may have been acquired under the Board of Trade General Licence dated July 12 last, authorizing the resumption of trade with Germany. The Order provides that no person shall transfer or deal in any way with any property subject to the charge, without the consent of the Custodian; and every person who owns or controls any such property must communicate the fact to the Custodian within three months, unless particulars have already been furnished to him in accordance with the Trading with the Enemy Acts. If any person is asked to pay any money or deal in any way with property which he has reason to suspect is subject to the charge, he must immediately report the matter to the Custodian, and follow out his directions. Any person who fails to comply with the provisions of the Order is liable to penalties.

Coke Prices and the Profiteering Act.—It was reported to the Lambeth Profiteering Committee at a recent meeting that, in connection with a complaint as to the price charged by the South Metropolitan Gas Company for a ton of coke, a communication had been received from the Board of Trade stating that the maximum price of coke on the date of the purchase was £2 10s. 2d. As the price of coke was controlled, it was not considered that there was any jurisdiction under the Profiteering Act to entertain a complaint in respect of the price; and they suggested that the complaint should be dismissed. The price charged by the Gas Company for the ton of coke complained of was £2 9s. 2d. The Committee accepted the ruling.

Tipton Gas-Works Accounts.—The accounts just issued of the Tipton Urban District Council Gas Department for the year ended March 31 last show an income on revenue account of £40,144, and a gross profit of £7178. After meeting interest and sinking fund charges, there was a net surplus to be carried to the accumulated profits account of £2608, bringing the balance of this account up to £16,689. The manufacturing statement of the Engineer and Manager (Mr. W. Prince) shows that the make of gas per ton was 14,909 c.ft., as compared with 12,953 c.ft. for the previous year; while the unaccounted-for gas was reduced from 9·8 to 6·5 p.ct. A calorific value of 500 B.Th.U. was maintained. There was last year a falling off of about 2½ million cubic feet in the quantity of gas made.



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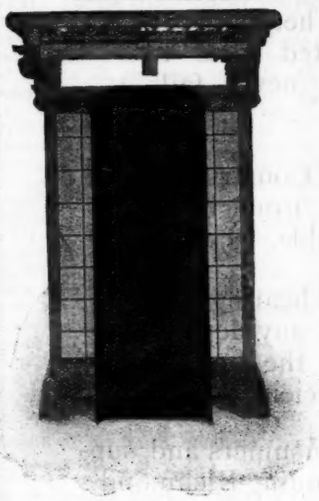

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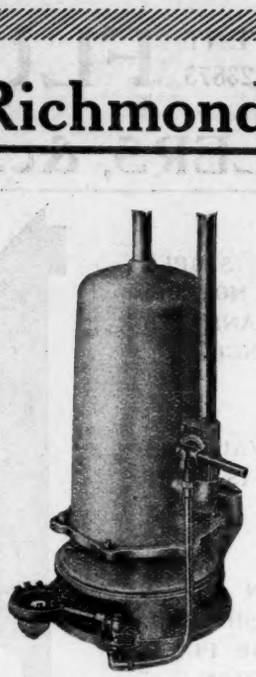

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Coal Rebate and Gas Price Reductions.

Consequent upon the rebate of 10s. per ton off the price of coal used for domestic and household purposes, the rebate to be given to domestic consumers amounts in Birmingham to 6d. per 1000 c.ft.; and this amount will be deducted from the accounts rendered at the end of the March quarter. The users of gas through automatic meters will have the benefit of the rebate at the next reading of meter-indices. The charge, with the rebate taken off, will be 3s. 4d. per 1000 c.ft. The Birmingham Gas Committee have had under consideration the question of increasing the price of gas consequent upon the higher railway rates. The amount of this increaee will be determined at the end of March; but it is announced that it will not be less than 2d. per 1000 c.ft. For the March quarter, the rebate to domestic consumers at Coventry will be at the rate of 7d. per 1000 c.ft.; but to meet rising railway rates, wages, &c., the price of gas for all purposes is being increased 3d. per 1000 c.ft. At Dundee, a reduction has been determined upon of 6d. per 1000 c.ft. in the price of gas used for domestic purposes. The rebate is to be 8d. per 1000 c.ft. at Lancaster, as from Jan. 1. The Malton Gas Company have decided to reduce the price of gas to household consumers by 10d. per 1000 c.ft., which will bring the charge to 3s. 2d. The reduction came into force on Feb. 1. The reduction made at Portsmouth is referred to in another paragraph. The Sowerby Bridge Urban District Council have decided to reduce the price of gas from 4s. to 3s. 6d. per 1000 c.ft. in accordance with the reduced price of domestic coal; and to allow a rebate of 8d. per 1000 c.ft. for the past quarter. The reduction made by the Sunderland Gas Company is 10d. per 1000 c.ft. Notice is given by the Wandsworth, Wimbledon, and Epsom District Gas Company that the rebate resulting from the 10s. reduction in coal is estimated to amount to 8d. per 1000 c.ft. on the gas used for domestic or household purposes in the Company's area of supply during the quarter ending Lady-day. The price in December last was 4s. 3d. per 1000 c.ft.; and the increase of 6d. which the Company announced at the beginning of this year made it 4s. 9d. Now with the rebate of 8d., the price will be 4s. 1d.

Strike at the North Middlesex Gas-Works.—Over 160 men employed at the North Middlesex Gas-Works, Mill Hill, ceased work on Saturday because, it is stated, seven men refused to join the National Union of General Workers; and the Company declined to dismiss them. An appeal by the management for volunteers was responded to by a number of City men residing in the district. Though the gas pressure was reduced, the lighting of the district was maintained; and it is announced that there will be sufficient gas for all necessary purposes. The men whom the Company declined to dismiss on the demand of the union men have been employed at the gas-works for many years. The whole of the clerks took off their coats directly the retort-house men left, and turned to with a will to help in maintaining the supply of gas.

No Coal at Leek.—The Leek Gas Committee reported last Tuesday that there was no coal in stock at the gas-works. It had, however, been learned that seventeen trucks were on the way; and it is therefore hoped that normal working would soon be resumed.

South Suburban Gas Bill Opposition.—Following upon reports presented of a conference of local authorities, held at Bromley, the Penge Urban District Council decided to support the authorities concerned in the presentation of a petition against the South Suburban Gas Company's Bill. The conference decided that an expert should draw up a report dealing with the Company's proposals.

Cannock Gas Company.—The annual balance-sheet just issued by the Cannock, Hednesford, and District Gas Company shows a total income for 1919 of £29,540, and an expenditure of £26,805, leaving a balance of £2735. Of this amount, £2160 is recommended as a dividend of 4½ p.ct. In 1916 the income and expenditure were each £10,000 less than last year. On that occasion, however, a dividend of 5 p.ct. was declared; the amount carried forward being only £49. Another feature of the report is the coal supply, which of late has been very short. On Dec. 31, the Company had in stock only 240 tons of coal; while on the corresponding day in 1916 there were 3690 tons in stock.

Shipley Gas Supply Failure.—The gas supply at Shipley failed on the night of the 27th ult., the pressure being so low that house lighting was little better than a glimmer and street lighting barely existed. A meeting of the District Council was held the same evening, in semi-darkness, assisted by candles, when the Chairman of the Committee (Mr. Thomas Hill) said the real cause of the trouble was a series of blockages in the carbonizing plant, due to the poor coal. The difficulties had been accentuated, too, by the prolonged shortage of coal supply. The works had no reserve, and were existing from hand to mouth. The coal trouble began with the miners' strike, up to which time Shipley had a good reserve.. In December they had to sweep out the coal-stores.

Portsmouth Reduced Prices.—The Directors of the Portsea Island Gas Light Company have decided to make an allowance in the price of gas to domestic consumers of 6d. per 1000 c.ft., as a result of the 10s. per ton reduction in the price of coal, and, in addition, a reduction of 2d. per 1000 c.ft. to all consumers, to date from the reading of the meters in December last (making a total of 8d. per 1000 c.ft. to all domestic consumers). The 6d. reduction will be given in the form of a rebate at the end of the quarter, and will be granted on 94 p.ct. of the total consumption, which amount of gas is used for domestic and household purposes in the town. This decision of the Directors is giving great satisfaction locally—particularly at the present time, when increased prices of labour and materials and additional rail rates have to be provided for. The Chairman (Mr. T. H. F. Lapthorn, J.P.), intimates that the reduction is the result of increased consumption of gas, improved working results, and greater production of, and higher prices realized for, residual products.

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The New Wages Award.—Mr. Will Thorne, M.P., addressing a meeting under the auspices of the National Union of General Workers at Huddersfield, remarked, in connection with the recent wages award to gas workers, that they would never accept the principle laid down in the award, whereby wages vary according to size of works.

Wombwell Coke and Bye-Product Company.—A Company has been registered under this title, with a capital of £200,000 in £1 shares, to take over from the Wombwell Main Company, Ltd., as a going concern, the business of coal washers and manufacturers of coke and other products of the carbonization of coal carried on by them.

Belfast Gas-Works Accident.—A Belfast Coroner's Jury returned a verdict of "Accidental death" in the case of John Hamill, a ganger, who slipped off a baulk of timber while shifting a piling machine at the Belfast Gas-Works, and fell 20 ft. into an empty dam, receiving injuries from which he died. Deceased was at the time of the accident in the employment of a firm of contractors.

Drogheda Gas Undertaking.—Hopes are freely entertained that the newly-elected Corporation in Drogheda will take the gas question in hand at once, and find a remedy for a state of things which is much complained of. The "Drogheda Independent," writing on the subject, says: "What is the root trouble at the gas-works, no one seems to know. There are grave financial difficulties it is understood; but these in the hands of capable men need not operate so as to retard and hamper local industries, to leave the streets of the town in Cimmerian darkness, to throw back upon the citizens at irregular intervals and on ridiculously short notice the need for finding other illuminants for their business premises and their domestic use."

Sleaford Gas Company, Ltd.—In submitting to the shareholders the accounts for the twelvemonth, the Directors express their deep regret at the loss the Company have sustained by the resignation of Mr. Harry Wimhurst, who, after having been Manager for 41 years, is retiring on March 31 next, consequent upon advancing years. The Directors remark that he has been an invaluable officer during this long period; and the position of the Company, from both the financial and constructional points of view, has been largely improved under his guiding influence. The appointment as Manager of Mr. S. Hands, of Harwich, has already been intimated in the "JOURNAL." A proposal will be submitted to the shareholders for a retiring allowance to be made to Mr. Wimhurst, who will remain a Director. The Board recommend a dividend at the rate of 10 p.ct. per annum, free of income-tax. There has been a steady demand for gas; but the reduction in the quantity of coal allotted to the Company has made it very difficult to adequately meet this.

Effect of the Price Reduction at Keighley.—As an effect of the reduced price of coal, the Keighley Gas Committee have announced that an equivalent to the 10s. reduction in coal will be returned to domestic consumers. At Keighley, it is calculated that 73 p.ct. of the gas made has been for domestic uses; and the reduction will amount to 9d., making the price 2s. 0½d. per 1000 c.ft. The Chairman of the Committee, at a Town Council meeting last week, said no arrangements had been made in the matter, and the Committee are placed in a peculiar position. Last year the gas profit was £5835, when they disregarded a sum of £4732 due to the sale of four years' accumulation of pitch; but this year expenses would be increased by £12,252, while the income would be raised by only £7206. Taking also into consideration the allowance of £1400 for street lighting, they would have a balance of only £669. The Committee had not been able to foresee this condition in time to increase the price sufficiently for the current year; and they could do no more than declare that they could not make a profit under the circumstances. They might find themselves asked how it was they could make a profit of £10,000 last year (including receipts from the accumulated pitch), and this year have a working balance of only £669.

Domestic Consumption in Dundee.—When the Dundee Corporation Gas Committee met to consider what reduction should be made [they decided upon 6d. per 1000 c.ft.] in the price of gas for domestic purposes, consequent upon the coal rebate, Mr. Alexander Yuill (the Gas Engineer) reported that 93·4 p.ct. of the production was used for domestic purposes, and 6·6 p.ct. for industrial processes. The reduction of 10s. per ton would have to be returned to the consumers, less 5 p.ct. In a list of supplies classed as industrial, he mentioned street lighting. Mr. James Reid asked if the gas for street lighting would not be supplied at the cheapest rate. The Engineer replied in the negative. He suggested that the Clerk should be instructed to write the Coal Controller on the question. This was agreed to. An abnormal increase in the consumption of gas was reported by Mr. Yuill. The figures had increased from 5,500,000 to 6,660,000 c.ft. per day; while the storage accommodation was 30 p.ct. of the maximum make in 24 hours. Unless arrangements were made for holders of 3½ million c.ft. capacity being constructed and in operation by next winter, the gas supply would be jeopardized. Mr. W. Nicoll (Convener) said it was absolutely necessary that something should be done immediately; and on his suggestion it was agreed to leave the matter with a Sub-Committee.

Injuries to several people were caused by a gas explosion in Glenthorne Road, Hammersmith, where tramway employees had been engaged repairing the track, and by some means the gas-main was fractured. Damage was also done to a house.

The Stanton Iron-Works Company, Limited, near Nottingham, have entered into an arrangement under which they have purchased, as from Jan. 1 last, the ironworks, foundries, and ironstone properties of Messrs. James Oakes & Co.—excluding, however, their collieries and clay-works. The Stanton Company, with whom are incorporated the Holwell Iron Company, are the largest producers of pig iron in the Midlands, and of cast-iron pipes in Great Britain; and the purchase of the Oakes business will add further three furnaces to the Stanton capacity, as well as give them control of a cast-iron foundry which is specially laid out for dealing with flange-pipes and with iron castings of a general nature. The further addition of local ironstone to their supplies of local ore, places the Stanton Company in an abnormally strong position among ironmasters in the Midlands.

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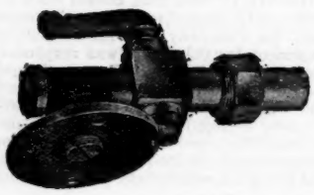

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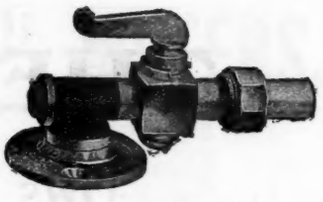

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The Gas Committee of the Southend Corporation have resolved that the Town Clerk be directed to instruct a gas engineer to consider and report, at an early date, upon the present condition of the Leigh gas undertaking, and as to the action which should be taken to meet future requirements.

The Burnley Town Council have decided to increase the salary of Mr. J. P. Leather (the Gas Engineer) from £550, *plus* £72 16s. per annum, to £800 a year inclusive. The salary of Mr. J. H. Clegg (Assistant Gas Engineer) was increased from £300, *plus* 3s. a week war bonus, to £400 per annum inclusive.

At the Burton-on-Trent Police Court on Friday, George Moorcroft was charged with stealing gas. It appears that the defendant interfered with the gas-meter, and affixed a pipe to the service, whereby the gas came straight from the street into the house, without passing through the meter. He was fined £5 and costs.

A national conference of manufacturers and producers will be held at Kingsway Hall, W.C., on the 10th and 11th inst., under the chairmanship of Mr. W. Peter Rylands, President of the Federation of British Industries. All the important associations of manufacturers and producers are taking part; and a number of subjects will be discussed—including that of fuel.

Subject to the approval of the Board of Trade, the Directors of the Tottenham District Light, Heat, and Power Company recommend a dividend for the half year ended Dec. 31, 1919, at the rate of 3⅜ p.ct. per annum on the "A" stock, and at the rate of 2⅝ p.ct. per annum on the "B" stock (all less income-tax), as compared with 4½ p.ct. per annum on the "A" stock and 3 p.ct. per annum on the "B" stock for the corresponding period. The amount to be carried forward is £7151, as compared with £4169.

At a recent meeting of the Burton-on-Trent Town Council, the salary of Mr. W. Wilson (the Gas Manager) was increased to £650 per annum.

A note in the daily Press is to the effect that the wages bill of the South Metropolitan Gas Company has increased by about £1,000,000 per annum since 1914.

The Gas Committee of the Manchester Corporation on Friday week entertained at dinner in the Town Hall those of the employees who had served in the wer. Altogether 376 men from the department enlisted, of whom 42 lost their lives, 65 suffered wounds, one was missing, and seven were taken prisoners. The toast "To the Men" was proposed by the Lord Mayor (Alderman J. Fox), and acknowledged by the Chairman of the Gas Committee (Alderman W. Kay), who offered a cordial welcome home to the returned soldiers and sailors.

"Diaphragm Gas Regulators and Governors" form the subject of a pamphlet received from the Bryan Donkin Company, Ltd., of Chesterfield. Illustrated particulars are given of different forms of Reynolds' patent governors. Points emphasized in connection with Reynolds' district governors are that they reduce gas from any pressure on the inlet up to 40 lbs. per sq. in. down to the ordinary district pressure; the gas pressure is maintained constant on the district, whatever the variations in demand and inlet pressure; absolute certainty of action under all conditions; there are no water-seals; the head-room required is very small; and the district pressure is adjustable, and can be changed whenever required. There are also Reynolds' high-pressure service regulators, especially designed for enabling low-pressure services to be connected direct to high-pressure gas-mains. If no gas is being consumed, the supply is absolutely shut off. Various other regulators, valves, &c., are dealt with in the pamphlet.

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All communications to be addressed to the GENERAL SECRETARY.

APPOINTMENTS, &c., VACANT.

ROMFORD GAS AND COKE COMPANY, LTD.

THE Position of Distribution Superintendent to the above Company HAS BEEN FILLED. Applicants are now THANKED.

WANTED reliable Working Manager for Small Devonshire Gas-Works—5 millions. House, Coal, and Gas Free. Stoker kept.
Apply, by letter, with recent Testimonial and Stating Wages required and when could commence Duties, to No. 6840, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

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WANTED—a Young Chemist who has had a good Technical Education for a Post in a Works in the South of France. The Duties will consist of Gas Analysis, Control of Tests of coal consumption, Recording Temperatures, Analysis of Refractory and other Materials used in a modern Glass-Factory. Experience of Oil Fuel Installations would be an advantage.
Reply Box 944, WILLINGS, 125, STRAND, W.C. 2.

OUTDOOR MANAGER.

WANTED—Qualified man of Tact and Resolution to take Complete Charge, under Engineer, of all Gas and Water Supplies and Distribution. Must be good Technical Man with Business Organizing Ability.
Salary commencing at £250 per Annum, *plus* 12½ p.ct.
Applications, giving full Experience, in own Handwriting, accompanied by Three *copies* of recent Testimonials—one from present employer—to be addressed to the undersigned.
By order,
F. A. RICKETTS,
Secretary.
Aldershot Gas, Water, and District Lighting Company,
Victoria Road, Aldershot,
Feb. 2, 1920.

FOREMAN MECHANIC.

FIRST-CLASS Man Wanted to Supervise and Carry Out the Repairs and Maintenance of a Large Acid Plant. Wages to commence, £5 16s. per Week. A man with General Chemical Works Experience and able to Control Labour.
Apply, by letter, stating Age and Experience, to No. 6828, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED by a Gas Undertaking in the South of England, an Experienced DISTRIBUTION INSPECTOR with Practical Training.
Apply, by letter, in first instance, giving full Particulars of Experience and Salary required, to No. 6841, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

A RETORT-House Foreman required at once at the Stretford Gas-Works, Stretford, Manchester. Eight-Hour Shifts. Wages to commence, £5 per Week (Seven Days), including War Wages and War Bonus. Must have knowledge of Electrically Driven Machinery and General Routine of Works.
Apply, giving Experience, References, and when at Liberty, to H. KENDRICK, Engineer and Manager, GAS-WORKS, STRETFORD, near MANCHESTER.

DRAUGHTSMAN Wanted, to act also as CLERK OF WORKS during Alterations at Midland Gas-Works for a Minimum Period of Twelve Months.
Apply, stating Age, Qualifications, and Weekly Salary required, to No. 6839, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

TOWN OF DUDLEY GAS LIGHT COMPANY.

JUNIOR TECHNICAL ASSISTANT.

A JUNIOR Technical Assistant is required, capable of carrying out the usual Gas-Works' Tests and Working Drawings. He would also be required to assist in the Management of the Works. Preference will be given to Applicants Trained on a similar or smaller sized Works, and who have received Practical Training in the Shops.
Applications, stating Age, Experience, and Salary required, must reach the undersigned by noon on Saturday, the 14th of February next. They may be accompanied by *copies* of Testimonials; but these are not essential in the first place.
FRAS. C. BRIGGS,
Engineer and Manager.
Gas-Works, Spring Gardens,
Dudley, Worcs.

WANTED—Smart Junior Assistant, with Laboratory Experience and Knowledge of Chemistry, also accustomed to making Works Tests.
Apply, in own handwriting, stating Age, Experience, Salary, and full Particulars, to the GAS AND WATER ENGINEER, Aldershot Gas, Water, and District Lighting Company, VICTORIA ROAD, ALDERSHOT.

WANTED—Junior Assistant. Must have good Knowledge of Chemistry and Able to Carry out all Works' Tests.
Applications, stating Age, Experience, and Salary expected, together with Testimonials, to be sent to Mr. J. W. AUCHTERLONIE, Engineer and Manager, Cambridge University and Town Gas Light Company.

WANTED, Two or Three Erectors, experienced in Coal and Water Gas Plant Erection.
Apply, giving Experience, Age, and Wages required, to No. 6835, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

CARBURETTED Water-Gas Operator required by the Leighton Buzzard Gas Company.
Application, stating Age, Experience, and Wages required, to be addressed to the MANAGER, GAS-WORKS, LEIGHTON BUZZARD.

GAS-FITTER Wanted, used to Main and Service Work and Fitting Modern Appliances. Wages, £3 5s. per 47-Hour Week.
Apply, stating Age and enclosing *copies* of Testimonials, to the MANAGER, GAS-WORKS, RIPLEY, DERBY

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WANTED—Three Stokers, with Knowledge of Boilers and Exhauster. Hand Charging. Eight Hour Day. Seven Days, with Relief. Applications from Single Men only (owing to Housing Difficulty) can be considered.
Fuller Particulars can be obtained from the MANAGER, Halstead Gas Company, Ltd., 3, Bridge Street, HALSTEAD, Essex.

APPOINTMENTS, &c., WANTED.

GAS Manager, who also has had Water-Works Experience, is Open to Engagement as MANAGER or MANAGER and SECRETARY of Works of 14 to 40 Millions. Good Testimonials. Correspondence invited. Abstainer. Married.
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(GAS DEPARTMENT.)

WANTED—One Water-Tube Condenser, in either Cast-Iron or Mild Steel Shell, to Pass 1½ million cubic feet per 24 Hours, having Connections 18 in. to 24 in. Diameter. Must be in good condition.
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THE above Company have for Disposal the following MATERIAL, lying at Wandsworth Works:—

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60	Do. Do. 6 in. Flanged Outlets at side.
60	Do. Do. 6 in. Socket Outlets at side.
4	21 in. by 15 in. deep Oval RETORT MOUTHPIECES, with Luted Lids and 6 in. Flanged Outlets at top.
4	Do. Do. 6 in. Flanged Outlets at side.
4	Do. Do. 6 in. Socket Outlets at side.
32	6 in. Socket and Spigot BENDS 1 ft. 6 in. long.
32	6 in. Socket and Spigot BENDS 3 ft. 3 in. long.
128	6 in. Flanged and Socket PIPES 4 ft. 4 in. long.
192	6 in. to 4½ in. dia. PIPES 10 ft. 3 in. long, with HALF BRIDGE in one Casting.
192	4½ in. to 4 in. HALF BRIDGE PIPES.
192	COVERS for BRIDGE PIPES.
192	4 in. DIP PIPES.
32	6 in. WIER VALVES.
	and other RETORT-HOUSE MATERIALS.

Also at the Mitcham Works of the Company, the following:

56	22 in. by 16 in. oval ∩ Retort MOUTHPIECES, with Self-Sealing Lids and 6 in. Socket Outlets.
96	22 in. by 15 in. Do. Do.
92	5 in. ARCH PIPES.
92	5 in. BRIDGE PIPES.
	6 in. to 5 in. ASCENSION PIPES and BENDS.

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